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BIOMEDICAL AND BEHAVIORAL SCIENCES
No. 35

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TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY

BIOMEDICAL AND BEHAVIORAL SCIENCES

No. 35

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AEROSPACE MEDICINE

EVOLUTION OF THE SPACE SUIT

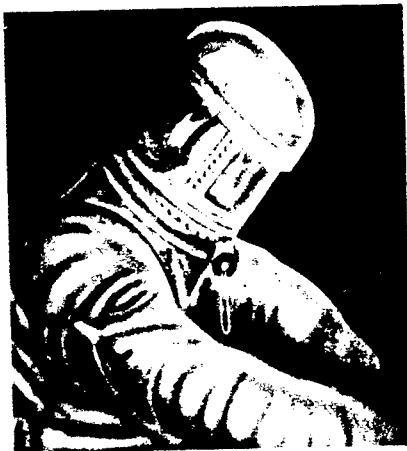
Moscow ZDOROV'YE in Russian No 4, 1978 pp 7-8

[Article by V. B. Malkin and I. N. Chernyakov, doctors of medical sciences]

[Text] The first cosmonaut, Yuriy Gagarin, after flying around our planet in 1.5 hours, landed in the steppe near Saratov. There was a woman, a local kolkhoz worker, nearby. The woman was frightened upon seeing the "strange person" (Gagarin wore a bright orange space suit).

Only a few years have passed since then, and our contemporaries have become used to the uniforms of cosmonauts. The mission of the Voskhod-2 spacecraft was largely instrumental in this; this is when man, cosmonaut A. A. Leonov, first engaged in extravehicular activity in open space. Millions of people saw this historic event on television screens: a cosmonaut, clad in a space suit, smoothly floated out of the lock chamber, inspected the spacecraft, took some motion pictures and safely returned into the cabin. Subsequently, American astronauts also left the pressurized spacecraft cabin for extravehicular activity in space and on the moon. Of course, they were always protected by space suits.

The cosmonauts adopted their outfit, the need for which to explore high altitudes had already been discussed by K. E. Tsiolkovskiy, from aviation. Actual use of a pressure suit during flights in aircraft with an open cockpit began in the mid 1930's, and it was first tested (in a pressure chamber, at an "altitude" of 25 km) by the well-known English physiologist, J. Haldane. On 2 April 1937, a reporter for the newspaper KRASNAYA ZVEZDA [Red Star] wrote: "Upon entering one of the laboratories of the Institute of Aviation Medicine imeni Academician Pavlov, we saw something unusual. A man in strange clothing was moving toward us. He was accompanied by design-engineer Chertovskiy and senior scientist Spasskiy. These were routine trials of the first Soviet pressure suit for high altitude flights, the Ch-3, designed by Chertovskiy. S. Korobov, a decorated pilot, who was wearing the pressure suit, answered the designer's questions in a muted voice." It is expressly wearing this pressure suit that S. Korobov, after successful tests in a pressure chamber, made the first flight on an aircraft on 19 May 1937.



Left: One of the first
Soviet aviation pressure
suits (1937)



Right: The space suit in
which Yuriy Gagarin made
history's first flight into
space



Cosmonauts Yuriy Romanenko and Georgiy Grechko at the central control
post for the Salyut-6--Soyuz-27 complex

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The modern space suit is an emergency device that saves a cosmonaut in the cabin, as well as a means of independent existence and work in space.

First of all, it permits normal respiration. There is no molecular oxygen at the altitudes maintained by spacecraft, while the atmospheric pressure is so low that it is impossible to use ordinary breathing equipment. The fact of the matter is that oxygen pressure must be higher in the lungs than in blood and tissues. For this reason, in case of accidental depressurization of the cabin an extremely serious situation may develop: oxygen begins to escape from tissues and blood, through the lungs. This would result in lowering the oxygen level in the body, of which there is already a small supply without this occurrence, and would rapidly induce acute hypoxia. For the same reason, it is impossible to work in space without a pressure suit.

Oxygen pressure in the lungs must be maintained in the range of 150-180 mm Hg for a cosmonaut to be able to live and work normally at high altitudes. Consequently, the pressure of this gas should be at this level or somewhat higher in the space under the helmet of the suit.

In the course of vital functions, there is constant production of carbon dioxide, which is eliminated by the lungs during respiration. Accumulation thereof in concentrations exceeding 2-3% under the helmet has a toxic effect on the body. In order to prevent this from happening, it was necessary to provide for ventilation of air in the suit helmet, commensurate with the volume of production of carbon dioxide, and the latter increases with increase in muscular exercise by a cosmonaut. For this reason, independent systems of regeneration of oxygen and absorption of carbon dioxide were provided in the space suit.

It is equally important to protect cosmonauts from vacuum. Low barometric pressure in itself could induce a serious state, decompression sickness, which resembles caisson's disease of divers. In the region of low barometric pressure, nitrogen dissolved in blood changes into a gaseous state; the formed free gas bubbles obstruct vessels and mechanically compress tissues, impairing their functions. At high altitudes, when atmospheric pressure drops to 47 mm Hg or lower, the fluids in the unprotected body are capable of "boiling," and so-called altitude boiling develops.

To rule out the possibility of decompression sickness, the pressure in the space suit must reach 300-400 mm Hg, or 0.4-0.5 atm, which corresponds to an altitude of 7-5 km. But because of the great tension of space suit layers, there is severe difficulty and restriction of movement by cosmonauts. For this reason, flexible articulations are provided in the space suit, in the form of "accordions," "orange segments," or sealed metal joints with bearings, for better mobility.

Another important problem is that of maintaining normal heat transfer in the body. It is known that there is continuous heat production in the course of vital functions. The level thereof at relative rest is about 90 kcal/h and it increases by 6-7 times when performing physical work. This amount of heat

would be sufficient to boil 5 liters of water. It is transmitted in part to less warm objects with which man comes in contact and partially dispersed by means of radiation and evaporation of perspiration; but heat transfer occurs mainly through convection, by heating the air that circulates constantly near the surface of the body.



Aleksey Leonov wore such a space suit when he took the first "walk in space."



This is what happens on the ground. The weightlessness of space precludes heat exchange via convection. Consequently, an artificial microclimate had to be created in the space suit. Scientists were mainly concerned with excess heat, since cooling, let alone overcooling, are unlikely in space.

Normal heat exchange was provided by ventilation in the early versions of space suits worn during brief flights: cabin air (or oxygen), cooled and dried in the life-support system, was delivered into the ventilation system of the space suit and removed heat and moisture from it.

Such a method of heat regulation is ineffective in long-term space flights, when a cosmonaut is subject to intensive physical loads and great expenditures of energy. For this reason, the engineers designed a system of water cooling: a system of thin, flexible plastic hoses stitched to the underwear, with circulating cooled water or other coolant with greater heat capacity than air. Heat is diverted by convection and radiation due to the close contact of the hoses with the body. This is how the problem of heat regulation was resolved in modern space suits, which were first worn by the crew of Salyut-6, Yu. V. Romanenko and G. M. Grechko.

We should dwell into more detail on this innovation, developed by Soviet scientists and engineers. The metal body of the space suit reminds one of the armors of medieval knights, while the sleeves and pant legs are made of soft material. They have laces, and they can be lengthened or shortened to fit the individual. The helmet is just as spacious, and it has a light filter that protects the face from ultraviolet and infrared radiation from the sun. Water cooling enables the cosmonaut to regulate himself the temperature conditions within the space suit. The cosmonaut enters this individual pressure cabin through a hatch in the back. All of the necessary units of the independent life support system are compactly arranged on its inner surface: oxygen tanks, pressure regulators, evaporation and regeneration units, etc.

A. Leonov was one of the first to test the new garb of cosmonauts. In his opinion, it is much more comfortable than the soft space suit in which he "walked in space." Leonov observed: "The new space suit can be 'put on' in a couple of minutes, by oneself, without the help of a comrade. It is pleasant to work in it, and one can do so for an entire work shift, rather than dozens of minutes. This space suit has a great future."

The mobility of a cosmonaut in the rigid space suit does not depend much on internal pressure level, and it will be possible to raise it to 0.5 atm or higher. At such a pressure, the danger of decompression disorders is completely eliminated, and it is possible to make use of a two-component gas medium, instead of pure, but inflammable oxygen. In addition, in the opinion of specialists, it will be possible to regulate the temperature in the hard space suit by means of radiation, which is the most economical in space.



Modern space suit, which Yuriy Romanenko and Georgiy Grechko wore when they worked in open space

There is every reason to believe that, in the not too distant future, people wearing such space suits will explore new planets. The missions of the Soviet cosmonauts are a guarantee of such feats.

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VETERINARY AND SANITARY SPECIFICATIONS FOR CONSTRUCTION OF SHEEP RAISING COMPLEXES

Moscow VETERINARIYA in Russian No 5, 1978 pp 24-27

[Article by G. K. Volkov, V. N. Gushchin, All-Union Scientific Research Institute of Veterinary Sanitation, and G. F. Tsiridi, Shoybulakskiy Sovkhoz, Mariyskaya ASSR]

[Text] At the present time, sheep raising complexes for 2,500-5000 ewes have been constructed in the nonchernozem region of RSFSR. Here, new technology is being adopted for raising sheep of the Romanov breed, which involves stall and grazing maintenance, year-round lambing, use of granulated feed mixes and raising different age and sex groups of animals on alkaline-earth fields.

Experience in operating the complexes and scientific research conducted in them have shown that such technology requires intensive good-quality feeding, strict adherence to sanitary and hygienic specifications in planning, construction and operation of complexes, provisions for optimum microclimate, organization of pasturage and active exercise for the animals.

Determination was made of a number of factors that lower the efficiency of this industrial technology: supplying physiologically weak animals to specialized farms; improper feeding and unsatisfactory upkeep of pregnant ewes and, as a result, birth of physiologically weak lambs (hypotrophy); lack of active exercise for young and adult animals; failure to adhere to the main requirement of industrial technology, that of rhythmic production and the principle of "all occupied--all vacant," which leads to crowded or underoccupied buildings, disruption of microclimate; delayed removal of manure; keeping sick and convalescent animals with healthy ones; infraction of sanitary-hygienic and zooveterinarian specifications referable to construction.

For this reason, the main sanitary-hygienic and zooveterinary measures must be decided upon before constructing sheep raising complexes. Veterinary specialists and zootechnologists must participate in planning the projects, starting with development of building design, expert certification of planning documents, choice of plan for a given climate zone and building site.

The location of a complex is determined with due consideration of geographic, geological and meteorological conditions, sanitary-hygienic, zooveterinary and technical-engineering requirements.

The site for a sheep-raising complex must be dry, somewhat elevated, not subject to flooding and with a low subterranean water level. Drainage work must be done if a complex is to be situated in a low area. Failure to abide by these requirements leads to development of humidity in the walls, accumulation of water in the manure ditches, deteriorates the microclimate, causes onset of colds and gastrointestinal diseases among the lambs.

In order to prevent the spread of polluted air and odors in the environment surrounding the site intended for the construction of complexes, trees are planted around it. It is imperative to provide for areas of perennial crop pasturage in planning and integration of sheep farms and complexes.

Special attention is given to the construction of veterinary-sanitary units and sanitary installations; without these units a sheep farm and complex cannot be operated.

A sanitary protection zone is created around the complex, which is subdivided into an external and internal part, to protect farms and complexes from penetration of pathogens of infectious diseases. The outer protective zone consists of sites for processing coarse feed, creation of perennial pasturage, use of manure as fertilizers, etc. The following are prohibited in this zone: construction of plants producing bone meal, processing hides, as well as various dumps and transit highways.

The inner protective or prohibited zone is provided to protect the complex from penetration of pathogens of infectious diseases. Its size is determined by the natural boundaries of the chosen site, topography of the area and landscaping. The sanitary protective zone must be 200-300 m wide.

The territory of a sheep-raising complex is surrounded with fencing at least 1.8 m tall, along which plants are provided over a strip 4-5 m wide, and it is divided into two zones: production (white), or zone A and administrative (black), or zone B.

The buildings for animals, with adjacent feeding and grazing areas, artificial insemination center, shearing center, veterinary and sanitary facilities and internal supply zone are contained in the production zone.

The administrative building, with veterinary disinfection center, warehouses and feed storage buildings, silos and feed shop (where granules are produced), boiler room, fuel supply and parking lot for vehicles servicing the complex are situated in the administrative zone.

Veterinary facilities are in the production zone: veterinary center, consisting of the physician's office, pharmacy with cellar for storage of biologicals and disinfectant warehouse, isolation ward for sick animals and those suspected

of having infectious diseases, on the basis of 0.5% of the total number of animals. The isolation ward is located on the leeward side, at least 100 m away from barns.

It is imperative to provide for a therapeutic-preventive (feed) center to increase the efficacy of therapeutic-preventive work, lower morbidity and mortality of young animals. This center is planned for 3% of the ewes. It is intended for treatment of sick animals detected in the course of dispensary care, supplemental feeding of weak sheep and rearing orphaned lambs. After the animals recover they are transferred to the fattening section.

In areas where there are veterinary and sanitary plants, one should provide for construction at the complexes of centers for collecting, performing post mortems and temporary holding of carcasses. Special vehicles are used to transport carcasses to the veterinary and sanitary plant.

In areas where there are no such plants, there must be construction of a slaughtering and sanitary center at the complex. It consists of a slaughtering department with a walk-in refrigerator, hide-salting section and department for gathering and utilizing carcasses. The slaughtering-sanitary center is situated on the boundary line, so that animals subject to slaughter would come from the white zone, while the sterilized products would be issued into the black zone. The slaughtering-sanitary center may be attached to the veterinary center.

On the borderline between the white and black zones, a loading ramp is built, with a separated pen and ramp on the side of the white zone to ship animals to other farms or the meat-packing plant. Scales are provided here also, to weigh the animals.

Entrance to the white zone is allowed only through the veterinary disinfection center, after changing into work clothing. All vehicles that pass into the white zone must be disinfected, mainly the moving parts thereof, or the entire vehicle, if necessary. For this purpose, there must be containers with working solutions of disinfectants and all the necessary equipment in the disinfection unit. Disinfectant mats to treat shoes are placed at the entrances to the sanitary disinfection centers and other units. These mats are determined by the width of gates (40-50 cm to either side of the gates, at least 20 cm in thickness).

The feed zone must be fenced and have its own driveways. During the period of processing feed, an outside driveway must be provided, which is closed down at the end of the season of delivering feed. Feed is delivered from the black zone to the white one by the internal fleet of vehicles or other mechanized means.

The territory of a sheep-raising complex must be well planned, and it should be provided with a network of roads and paved paths. Lawns and plants, tree and bush windbreaks are provided in order to prevent the spread of odors, dust and bacterial contamination over the complex, as well as beyond its confines.

As a rule, the buildings should face the south (with the longitudinal axis from north to south). Depending on local conditions, prevailing wind direction, topography and other factors, it is permitted to deviate from the recommended meridional orientation by up to 35-45°. The buildings are so placed as to be able to air them from end to end. This makes it possible to rapidly remove polluted air from the spaces between buildings.

Beyond the fencing, a paved area is provided 200-300 m away from the complex for gathering, storing and biothermal decontamination of manure. The manure storage building is surrounded by a fence and landscaped strip, and there are paved access roads to it.

Industrial raising of Romanovskaya sheep requires a refined technology, strict adherence to hygienic feeding and upkeep conditions.

Effective use of buildings, machinery, equipment and manpower, provisions for appropriate sanitary and hygienic conditions are achieved when insemination, lambing and transfer of technological groups of sheep according to size take place in strictly specific, uniform periods of time. The buildings or sections are filled up and emptied at one time, in accordance with the principle of "full and vacant."

Rhythmic production is a guarantee for successful industrial technology of raising Romanovskaya sheep. Without this, the concentration of ewes will not yield the required effect from using capital investment and resources, and leads to disorganized work, as well as infraction of sanitary and hygienic rules and shortfalls. The rhythm of production depends on the number of ewes in the complex, the lambs they produce per year and size of the technological group of pregnant ewes.

Technological groups of ewes create the basis for production flow. Throughout the production cycle (from insemination to lambing), transfer of technological groups of ewes from one building to another should be made apart from other technological groups. These measures help protect the complex from penetration and spread of pathogens of infectious diseases and conditionally pathogenic microflora.

Systems of veterinary and hygienic measures to prevent diseases and treat animals, clean, disinfect, exterminate insects and rats from buildings, for the removal and processing of manure are organized in accordance with the "empty--full," "front to back" principle.

Sheep of the Romanovskaya breed require this technology of maintenance because of their biological distinctions, which involves freedom of movement and exposure to environmental factors. In the summer, it is imperative to organize grazing on cultivated pasturages for pregnant ewes and young stock. Without this, it is difficult to maintain the defense properties of the animal organism on a high level and obtain healthy, highly productive young animals.

Areas of 4-6 m² for each adult animal and 2-4 m² for lambs 1.5 months of age and replacement stock are organized for feeding and pasturage in order to organize active exercise for the sheep. The feeding and grazing areas must have a firm surface, slopes and ditches for drainage and collection of urine, rain water and melted snow; they must be fenced, equipped with self-feeders for concentrated and granulated feeds, mangers for rough feed and water troughs.

As a rule, the sheep barns are unheated and have a natural ventilation system. For this reason, the material from which sheep pens are constructed is an important factor. The insulation of the walls is planned for high and low ambient temperatures. The resistance to heat transfer of walls should constitute at least 2 m² C/W and that of a combined roof, 2.5 m² C/W.

In the buildings for lambing, artificial lamb raising and rearing young stock, the therapeutic and preventive center must have a forced air system of ventilation and exhaust, with provisions for heating air in the wintertime. For this purpose, heating and ventilation units with electrical, steam and water heating of air and use of TG-2.5, TG-75 and TG-150 heat generators are used. The most popular system is centralized delivery of air into the upper zone of the building through four perforated polyethylene air ducts.

The ventilation system should provide for the required level of air exchange, maintain the optimum air temperature and humidity, remove the maximum amounts of moisture, deleterious gases, dust and microorganisms. In the wintertime, air exchange in lambing barns constitutes 20-25 m³/h, in the transitional and summer periods, 45-90 m³/h per ewe with lambs; it should constitute 0.9-1.8 m³/h in buildings for artificial raising and rearing of lambs in the wintertime, 3-3.5 m³/h in the transitional and summer periods per kg lamb weight.

The following microclimate is maintained to create optimum conditions: 3-6° in pens for nonbred and pregnant ewes, 10-16° air temperature in pens for lambing, 10-14° in barns for fattening animals and 14-18° in barns for artificial raising and fattening of young stock; relative air humidity should be 80% for pregnant ewes and 65-75% for the other groups.

The size of the pens plays an important role in forming the microclimate. It should constitute 8-12 m³ per sheep and 3-4 m³ per lamb. If they are smaller, air exchange must be more frequent and it is difficult to regulate the microclimate.

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TOXIGENIC TYPES OF CLOSTRIDIUM PERFRINGENS IN FEED

Moscow VETERINARIYA in Russian No 5, 1978 pp 27-29

[Article by V. G. Ivanov, All-Union Scientific Research Institute of Veterinary Sanitation]

[Text] In large livestock farms, with a high density of animals in stalos, diseases are recorded that are induced by conditionally pathogenic microorganisms (dysentery, viral gastroenteritis, colibacteriosis, anaerobic enterotoxemia, mycotoxicosis, salmonellosis and others).

Clostridial enterotoxemia is observed in large livestock farms using the concentrated type of feed and high protein content in the diet, when there is frequent and abrupt change in feed, mildewing of feed, as well as when early maturing breeds of animals are raised. Many researchers have listed these causes. However, there is also another opinion concerning the correlation between enterotoxemia and increased use of mixed and concentrated feed contaminated with *Cl. perfringens* and other anerogenic microorganisms.

On the basis of the results of their investigations, P. Moraillon and N. Jalcin (1966) observed that, in many cases, diseases of cattle, sheep and goats are due to ingestion of feed contaminated with *Cl. perfringens*. Meat meal and dry milk were found to be the most infected of the components of mixed feed. The authors describe cases of dysentery in several herds of lambs. To determine the causes of infection, the animals' viscera and dry milk used in feed were submitted to bacteriological examination. In both instances, a large amount of pathogenic types of *Cl. perfringens* was demonstrated.

R. V. Katch (1966) indicates that 80% of the cases of clostridiosis are related to the intake of concentrated feed. He diagnosed hemorrhagic swine enteritis induced by granulated feed contaminated with *Cl. perfringens* (20,000 to 1 million bacterial cells per gram).

The importance of testing feed for toxigenic anaerobes was discussed at the 37th session of MEB [International Office of Epizootics], at which it was recommended that due attention be given to this parameter in bacteriological studies. In the "Recommendations for standard methods of microbiological testing and evaluation of meat, bone and fish meal intended for use as animal

feed," a negative result of tests for anaerobic microorganisms that are pathogenic to animals is one of the parameters of quality of feed from the standpoint of veterinary sanitation.

In view of the importance of this question, we conducted studies for the detection of toxigenic types of *Cl. perfringens* in feed at livestock farms.

Material and Methods

Samples of different batches of feed belonging to two industrial livestock complexes and one farm of the nonindustrial type served as the material for our study. We took 50 g of an average sample of feed, ground it thoroughly in a sterile porcelain mortar with saline and made cultures in several test tubes with Kitt-Tarozzi medium and two bacteriological dishes with Wilson-Blair medium and blood agar according to Zeissler. Some of the tubes were heated for 20 min at 80° temperature to destroy vegetative forms of anaerobes.

The cultures on Wilson-Blair medium were made analogously to cultures for overall bacterial contamination, the only difference being that medium that solidified in the dishes was additionally covered with 10-15 ml MPA or the same medium to create anaerobic conditions. Dishes with Zeissler's blood agar were placed in a microanaerostat, while those with Wilson-Blair medium were put in an ordinary incubator. The cultures were kept there at a temperature of 37°.

We recorded the results of cultivation on the very first day. When Wilson-Blair medium turned black 1-4 h after inoculation and there was rapid onset of growth on Kitt-Tarozzi medium (within 4-5 h), with profuse gas production, the cultures were considered to be typical of *Cl. perfringens*.

Upon detection of growth on Kitt-Tarozzi medium, the material was submitted to microscopy, and pure cultures were isolated by means of plating in 2-3 dishes with agar, which were kept under anaerobic conditions at a temperature of 37° for 24-28 h. Then we examined growth in the dishes and selected cultures that were classified according to morphological and biochemical properties inherent in given microorganisms and adopted in microbiological practice. To test for contamination with anaerobic microflora, cultures were made on MPA and MPB [beef-extract agar and beef-extract broth].

Biological tests were performed on guinea pigs and white mice, by means of intraperitoneal infection with broth culture (MPPB) in a dosage of 0.1 to 1 ml. The reaction of toxin neutralization by specific serum was run to identify the *Cl. perfringens* types. For this purpose, a minimum lethal dose of culture with 0.2-0.5 ml of the corresponding type-specific serum were kept in the incubator for 45 min and injected intraperitoneally to guinea pigs or white mice. The tested culture or filtrate thereof was administered to animals without serum as a control. We identified the type of microorganism on the basis of survival of animals given the corresponding type-specific serum.

Results

A total of 45 samples of feed from different batches, including 19 from an industrial cattle-fattening complex, 7 of which were samples of mixed feed used at the first stage of fattening, 5 used at the second stage, 5 used at the third stage and 2 samples of ZTsM [expansion unknown], 15 samples from an industrial swine-breeding complex (7 samples of SK-3, 1 of SK-8, 2 of SK-11, 3 of SK-16, 1 of SK-21 mixed feeds and 1 sample of fish meal), 11 samples of mixed feed from a farm of the nonindustrial type (4 samples of mixed feed for suckling pigs, 2 for sows and 4 for calves) were submitted to bacteriological analysis.

Most of the feed samples (71.1%) presented general contamination by *Cl. perfringens* in the range of 10 to 1000 microbial cells per gram. The percentage of feed contamination by these microorganisms was about the same in all types of farms: 73.6% in the industrial cattle-fattening complex, 73.3% in the industrial swine-raising complex and 63.3% in the nonindustrial type of farm.

Determination of cultural-morphological and biochemical properties of the selected 194 cultures established that 113 of them presented the characteristics inherent in *Cl. perfringens*. Testing the pathogenicity of these cultures on laboratory animals revealed that only four had this property: the cultures isolated from mixed feed SK-16 with a contamination level of 110 microbial cells per gram, SK-3 with contamination of 30 and 400, and the mixed feed for sows in the nonindustrial farm, with a contamination level of 1000 microbial cells.

On the basis of the reaction of neutralization of toxin by type-specific antitoxic sera, the *Cl. perfringens* were classified as types E, B and A, respectively.

It should be mentioned that toxigenic types of *Cl. perfringens* were isolated from the feed of farms where diseases with undetermined etiology had been recorded among the animals.

Conclusion

Contamination of feed with *Cl. perfringens* microorganisms constituted a mean of 71.1% and ranged from 10 to 1000 microbial cells per gram. Toxigenic types of *Cl. perfringens* were isolated from four samples, and they were identified as types A, B and E.

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AGROTECHNOLOGY

INQUIRES ABOUT VACCINES, TIME STANDARDS ANSWERED

Moscow VETERINARIYA in Russian No 5, 1978 p 124

[Article: "Answers to Readers Inquires"]

[Text] To Feldsher I. P. Tikhonenko (Dnepropetrovskaya Oblast), from V. S. Panov, deputy head of the Main Administration for the Biological Industry, USSR Ministry of Agriculture:

In response to your letter, addressed to the editorial board of this journal, let us inform you that concentrated alum vaccine against calf paratyphoid is manufactured by the Armavir and Omsk biological factories and the Alma-Ata Biologicals Combine in vials of 20, 50 and 100 ml.

Other products are produced in accordance with the standards and specifications approved by the USSR Ministry of Agriculture. At the present time, the question of dispensing different types of biologicals in smaller vials is being discussed.

To the veterinary workers of the Sovkhoz imeni Tyurupa, Ufimskiy Rayon of Bashkirskaya ASSR from N. G. Bilyalov, head of the Administration for Supplying Workers to the Bashneft' Association:

The time-related standards pertaining to requirements of casual workers to implement veterinary treatment of animals at kolkozoes, sovkhozes and other agricultural enterprises, approved by the USSR Ministry of Agriculture on 26 July 1974, stipulate that casual workers be assigned to perform veterinary work in limited periods of time, such work being of high quality and in accordance with relevant instructions and manuals, for implementation of epizootic control, therapeutic and preventive treatment of animals (mass scale tests, inoculations, collection of blood and other procedures), as well as veterinary sanitation measures at livestock farms.

The daily schedules for animal processing by one specialist and casual workers were prepared on the basis of a 7-h work day (6-day work week).

The norm for animal treatment is determined by dividing the work time (420 min per day) by the standard time in minutes, as established for a given type of veterinary procedure.

The standards take into consideration the time spent by a veterinary specialist directly on procedures with an animal (administration of an agent, reading reactions, taking blood, etc.), provided he is furnished with a qualified assistant, an orderly who should not be used as an ancillary [casual] worker.

For example: It is necessary to test 400 head of cattle out in the pasture for tuberculosis using the intracutaneous test in 1 day (the norm is 200 head). To perform this task $(400:200) = 2$ veterinary specialists, $(2 \times 1) = 2$ veterinary orderlies and $(2 \times 3) = 6$ casual workers will be required.

The time standards with indication of the daily work load norm per specialist and need for casual workers are available at the sovkhos according to types of veterinary work. The Administration has issued instructions to sovkhos management to be guided by these standards in the future.

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AGROTECHNOLOGY

TO THE ATTENTION OF SPECIALISTS

Moscow VETERINARIYA in Russian No 5, 1978 p 126

[Announcement]

[Text] Posters in the series, "Zootechnical and veterinary advice to kolkhozes and sovkhoses" (Index 70334), published by the Kolos Publishing House, disseminate information about scientific advances and progressive knowhow in the livestock industry. They help farm workers and veterinary specialists learn about effective methods for breeding, feeding and keeping cattle, preventing diseases and treating animals.

The poster-bulletins serve as a graphic aid in educating personnel on a mass scale. A popular text is accompanied by colorful drawings, photographs and charts.

In 1978, there are plans to print such bulletin-posters on the following topics, to assist veterinary specialists:

- "Insecticides and Acaricides in Aerosol Packages"
- "Cattle Mange and Control Thereof"
- "Animal Breeders: Adhere to Personal Hygiene Rules"
- "Infectious epididymitis of Rams"
- "Group Treatment of Animals Against Helminthiasis"
- "Mechanization of Veterinary Sanitation Work"
- "Fowl Ectoparasites and Control Thereof:"
- "Animal Husbandry and Environmental Protection"
- "Blood-Sucking Flies and Control Thereof"

The poster-bulletins in the series, "Zootechnical and veterinary advice to kolkhozes and sovkhoses" are published twice a month. Subscription rates: 2.40 rubles per year, 1.20 rubles for 6 months and 20 kopeks for 1 month.

Subscriptions are accepted by public printed media distributors on the job and in schools, at the subscription centers of Soyuzpechat' [Main Administration for Distribution of Publications], post offices and communications departments.

Send in your subscriptions early. These posters are not sold at Soyuzpechat' stands.

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DETERMINATION OF THE ACTIVITY OF CERTAIN BLOOD ENZYMES IN ACUTE AND CHRONIC PNEUMONIA

Kiev VRACHEBNOYE DELO in Russian No 4, 1978 pp 27-29

[Article by G. L. Rapoport, L. A. Kekalo, N. A. Babenko, V. I. Afon'kina, N. G. Arzhanikh, B. M. Volosyanko, P. I. Gostyuk, and K. N. Kravets, Department of the Propedeutics of Internal Diseases of the Ivano-Frankovsk Medical Institute]

[Text] Despite the fact that recently enzymological tests have become the subject of intent study they have not yet been sufficiently widely employed in diseases of the respiratory organs. The data available in the literature on this topic are not numerous and are contradictory (A. Ye. Sigal, 1956; Yu. V. Anshelevich, 1963; I. A. Zhivotovskaya, 1969; A. M. Masuyev et al., 1970; P. M. Vakalyuk, et al., 1971; N. I. Guseva, Yu. A. Osipov, 1972; Khashen, 1970).

We attempted to compare the changes in activity of eight blood enzymes with the peculiarities of the clinical course of acute and chronic pneumonia in order to study the possibility of using these enzymological tests in the clinic.

We observed 70 patients in age from 16 to 72, of them 43 with acute pneumonia (27 with acute and 16 with a lingering course), and 27 with exacerbation of chronic pneumonia (14 in the first and 13 in the second stage). There were 20 healthy people in the control group.

The set of enzymological studies which were made before and after hospital treatment included determination of the activity of ceruloplasmin (CP) according to G. A. Babenko's method (1963), alkali phosphatase (AP) by the standardized method with the help of a set of reagents bio-IA-test, of serum cholinesterase (CE) according to the technique of V. A. Sveshnikov and G. Ya. Pekker (1965), catalase (CL) according to the method of A. N. Bakh and S. Zubkova (1921), carbonic anhydrase (CA) according to V. P. Bendt's method (1947), aspartase and alanine aminotransferase (AST and ALT) according to the method of S. Reytman and Frenkel (1957), and the degree of saturation of transferrin (TF) by iron according to the method of G. A. Babenko (1965).

The conducted studies indicated that the activity of ceruloplasmin (CP) in all forms of pneumonia was augmented and exceeded the normal indices 1.5-1.8-fold. An increase in the activity of ceruloplasmin was a natural and fairly constant reaction of the organism of patients with pneumonia; in only 11 of the 70 patients the CP activity did not exceed the limits of the upper border of the norm. The highest indices for CP activity were obtained in patients with a lingering course of the inflammatory process (on the average 53 ± 3.35 con. units with the norm 29 ± 1.01 con. units). We established a clear dependence of increased CP on the degree of activity of the inflammatory process. A comparison of the CP with indices of the hemogram, haptoglobin, seromucoid, S-reactive protein and sialic acid showed that it is the most sensitive test for the activity of the inflammatory process. At the same time the degree of increase in CP activity had little relationship to the severity of the disease and the disorder in the function of external respiration.

Attention should be given to the high degree of increased activity of the enzyme in patients with acute and chronic pneumonia with pronounced syndrome of bronchial spasm (on the average-- 57 ± 1.3 units, which reliably exceeds the indices obtained in the remaining patients).

The activity of alkali phosphatase (AP) more than doubled both in acute and in exacerbated chronic pneumonia, and averaged respectively 66 ± 2 and 65 ± 1.9 units (with the norm 32.7 ± 2.3). The mean indices for AP activity were almost the same in all the clinical groups. However in examining the individual AP indices we found that the highest increase in its activity (58-75 units) was observed with a severe course of the inflammatory process: in lobar and bilateral pneumonia, and in the presence of diffusion pneumo-sclerosis and bronchial spasm.

Less natural were changes in the activity of serum cholinesterase (CE). In all forms of pneumonia a marked tendency was noted towards a reduction in enzyme activity (3.32 ± 0.18 units with the norm 3.57 ± 0.12), however, only in patients with chronic pneumonia of the second stage this reduction was statistically reliable (on the average 3.0 ± 0.13 units).

A reduction in CE activity to a considerable degree corresponded to the severity of the disease: the lowest indices were found in patients with a lingering course of the disease (3.32 ± 0.18), and with exacerbation of chronic pneumonia of the second stage (3.0 ± 0.13). At the same time a reduction in CE activity was combined with pronounced hypoalbuminemia which agrees with the data of N. V. Prakhov et al. (1964) and I. A. Latfullin (1973).

Based on the fact that the allergic diseases are usually accompanied by considerable changes in CE activity (A. D. Ado, 1946; N. M. Gracheva and A. M. Naumova, 1973) we made a separate examination of the CE indices in pneumonia that occurred with symptoms of bronchial spasm and other symptoms of an allergy (allergic rhinitis, eosinophilia, etc.). It was found that in this group of patients a sharp reduction in CE activity is observed especially frequently, and in a number of cases--to 2-2.2 units.

Published data on changes in catalase (CL) activity of the blood during pneumonia are meager and contradictory. While some researchers observed an increase in the catalase activity of the blood (R. P. Porfir'yeva, T. Ya. Kivman, 1963; P. V. Dubiley, 1971), other authors consider a progressive decrease in the CL indices to be characteristic (T. A. Katayeva, 1975).

We established a reliable increase in CL activity of the blood both in acute and in exacerbated chronic pneumonia (respectively 19.3 ± 0.5 and 20.74 ± 0.4 with a norm of 10.33 ± 0.23 units). Here we did not find a significant difference in the degree of blood catalase activity in patients with different variants in the course of pulmonary inflammation. The activity of the inflammatory process also did not have an important effect on the enzyme activity indices.

Analysis of individual CL indices can reveal a pronounced tendency towards increase in the blood catalase activity in patients with marked hypoxemia.

Certain researchers recommend using determination of the activity of aspartate-aminotransferase (AST) as an index for the activity of the inflammatory process in pulmonary diseases (T. A. Pochechuyeva, 1966; P. M. Vakalyuk, et al., 1971).

According to the data of our research AST activity in acute pneumonia and exacerbations of chronic pneumonia fluctuates in broad limits (from 18 to 140 units). Its mean index in acute pneumonia was 33 ± 8.2 units, and in chronic-- 32 ± 6.0 units, which only slightly exceeds the norm (26 ± 5.1 units). A significant increase in AST activity was only found in 16 of the 70 patients, and usually coincided with the corresponding changes in other biochemical indices for activity of the inflammatory process. Here an increase in AST activity was a less sensitive test than the change in protein fractions of the blood, the seromyoid content, content of sialic acid, and appearance of S-reactive protein in the blood. The ALT indices in acute and exacerbation of chronic pneumonia were not significantly altered.

The carbonic anhydrase (CA) activity was almost the same in all the clinical groups of patients with pneumonia (0.96 ± 0.98 units), while its mean indices did not differ from the norm (0.97 ± 0.05). Only in patients with sharply pronounced pulmonary deficiency and hypoxemia was there a distinct tendency towards an increase in CA ($1.06-1.08$ units) which can be viewed as one of the numerous adaptive mechanisms in the organism's struggle against hypercapnia and acidosis. Significant changes in the degree of transferrin saturation of iron (TF) were not established in any of the clinical forms of pneumonia we studied.

After treatment in the patients with acute pneumonia positive shifts were noted in the indices for activity of ceruloplasmin, alkali phosphatase, and cholinesterase, however normalization of the activity of enzymes significantly lagged behind the clinical and x-ray criteria of recovery.

In patients with lingering pneumonia after treatment a reliable reduction began in the activity of CP and AP, however their mean indices remained significantly higher than the norm. In chronic pneumonia only the activity of CP was reliably diminished, while the indices for AP activity were decreased insignificantly. The CE activity after treatment showed a tendency to increase, while the catalase activity of the blood remained at a high level with a slight tendency to diminish.

Consequently, comprehensive determination of the activity of ceruloplasmin, alkali phosphatase and blood catalase in pneumonia can give additional information on the activity of the inflammatory process, the severity of the disease, and the effectiveness of treatment.

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STUDY OF THE SPECIFICITY OF THE CHEMICAL METHOD OF DETERMINING ACETYLCHOLINE

Moscow LABORATORNOYE DELO in Russian No 5, 1978 pp 296-298

[Article by P. I. Syabro, V. I. Litvinenko, B. A. Smirnov, and E. V. Tkachenko, Normal Physiology Department of the Dnepropetrovsk Medical Institute]

[Text] Biological and chemical methods exist for determining the level of acetylcholine in the blood and in other biological fluids. The acetylcholine content in biological methods is determined by its capacity to evoke contractions in leech muscles [1], or contractions in a frog's lung [2]. Utilization of a biological method in a clinic is made difficult as a result of the necessity of having selected animals, individual sensitivity of animals at different seasons, a wide range of corresponding reaction in each experiment, poor reproducibility of the experiments which does not provide opportunities for doing serial research. The chemical methods are simple and easily reproduced, but are undergoing serious criticism [3,4]. In the Journal "Laboratornoye Delo", 1972, No. 2, a discussion was begun on the possibilities of applying a chemical method of determining acetylcholine content in laboratory diagnosis.

Table 1

(1) Содержание ацетилхолина в крови

	(2) Проба крови	(3) Концентрация ацетилхолина, определенная						Коеффициент корреляции (r) (6)
		биологическим методом (4) (в мкг%)			химическим методом (5) (в мг%)			
		M ± m	n	P	M ± m	n	P	
(7) После введения адреналина	1-я	1,2±0,2	8	<0,05	19,0±3,0	8	0,01	0,40
	2-я	1,9±0,2	8		35,0±5,0	8		0,40
(8) После введения эфедрина	1-я	0,96±0,2	10	<0,001	18,0±4,6	10	<0,05	0,70
	2-я	1,5±0,2	11		34,5±6,0	11		0,72



Key

1. Acetylcholine content in the blood
2. Blood sample
3. Concentration of acetylcholine, determined
4. By the biological method (in mkg%)
5. By the chemical method (in mg%)
6. Correlation coefficient
7. After introduction of adrenalin
8. After introduction of ephedrine

The research of A. V. Kibyakov [5] showed that removal of a large part of the pancreas from animals leads to a significant reduction in acetylcholine synthesis. In the pancreas, as is known, choline is formed, which participates in the synthesis of acetylcholine. In connection with this, removal of the pancreas can be used as a technique for characterizing the specificity of the chemical method of determining acetylcholine. Moreover, the dynamics of acetylcholine change can be followed in changes in blood pressure induced by pharmacological substances.

The aim of the present work was the study of the specificity of the chemical method of determining the level of acetylcholine in the blood. The first task was to conduct a comparative evaluation of the chemical and biological methods in parallel analyses of one and the same blood sample; the second was to rate the specificity of the chemical method, determining the acetylcholine content of the blood before and after removal of the pancreas, as well as upon an increase in blood pressure evoked by the introduction of pharmacological substances.

Experiments were performed on five dogs, with the two carotid arteries moved into the cutaneous muff. They were utilized for recording a temporary increase in blood pressure by means of intravenous introduction of pharmacological substances (adrenalin and ephedrine), and nine-tenths of the pancreas was removed from two of the dogs. Blood was taken from a cutaneous vein of a rear paw for determining acetylcholine content of the blood: the first sample in the morning before the experiment; the second, during lowering of the raised blood pressure. Acetylcholine content of the blood was determined in parallel by two methods: the biological for frog lung [2], the chemical by the Hestrin method [6]. In addition, the activity of true cholinesterase in blood erythrocytes according to Hestrin [7] was established. The concentration of acetylcholine in the blood was calculated according to a standard solution of acetylcholine. One hundred nine experiments were done. The results of the experiments are presented in Tables 1-3, the figures of which were handled by the statistical method of paired comparisons.

Table 2

(1) Результаты определения активности истинной холинэстеразы (в условных единицах) в крови собак

	(2) Пробы крови	(3) Концентрация истинной холинэстеразы		
		$M \pm m$	n	P
(4) После введения адреналина	1-я	$30,0 \pm 3,0$	5	<0,001
	2-я	$10,0 \pm 2,0$	5	
(5) После введения эфедрина	1-я	$46,0 \pm 5,0$	5	<0,01
	2-я	$23,0 \pm 4,0$	8	

Key

1. Results of determining the activity of true cholinesterase (in appropriate units) in the blood of dogs
2. Blood sample
3. Concentration of true cholinesterase
4. After introduction of adrenalin
5. After introduction of ephedrine

Table 3

Key

1. Results of determining the activity of true cholinesterase and acetylcholine in the blood of dogs by the chemical method
2. Dog
3. Concentration in blood
4. Acetylcholine, mg%
5. True cholinesterase, mg%
6. Before removal of pancreas
7. After removal of pancreas
8. On the 3rd day
9. On the 6th day
10. On the 19th day
11. Before removal of the pancreas
12. After removal of the pancreas

(1) Результаты определения активности истинной холинэстеразы и ацетилхолина в крови собак химическим методом

(2) Собака		(3) Концентрация в крови	
		(4) ацетилхолина, мг%	истинной холинэстеразы, мг% (5)
№ 1	(6) До удаления поджелудочной железы	40,0	10,0
	(7) После удаления поджелудочной железы:		
	(8) на 3-и сутки	0,22	12,0
	(9) на 6-е сутки	2,0	2,0
№ 2	(10) на 19-е сутки	48,0	10,0
	(11) До удаления поджелудочной железы	28,0	10,0
	(12) После удаления поджелудочной железы (на 5-е сутки)	2,0	1,4

Results of Research. In the first stage of research parallel determinations of acetylcholine content in the blood of the dogs were made by biological and chemical methods. The results of these are presented in Table 1.

From Table 1 one can see that between the concentrations of acetylcholine researched by the biological and chemical methods there exists a regular relationship: there appear increases and decreases of a single type in the content of acetylcholine in the blood in determination by both methods, although the absolute data differ sharply. A moderately close correlative link ($r = 0.4 - 0.7$) was established. This permits one to consider that in cases where the biological method tends to increase the manifestation of acetylcholine, this tendency is preserved in the chemical method. In this connection one can reach a conclusion on the possible use of the chemical method of determining the level of acetylcholine in the blood for approximate evaluation of cholinergic activity of the blood, which is very important for practice. Here the determination of the activity of true cholinesterase considerably amplifies such an evaluation.

The decrease in activity of true cholinesterase in the second sample after an increase in blood pressure is evoked by the introduction of adrenalin or ephedrine, and confirms the possibility of utilizing joint determination by the chemical method of the level of acetylcholine and true cholinesterase for characterizing the cholinergic activity of the blood. Upon comparison of the data we obtained with the results of other researchers on the determination of acetylcholine content of the blood in animals and people by chemical and biological means, one can note the presence of common regularities.

The extirpation of a large mass of the pancreas in dogs leads to a significant reduction in the activity of true cholinesterase and the acetylcholine content of the blood of dogs determined by the chemical method. Especially significant reductions were noted 5 to 6 days after the operation. The results of this research are presented in Table. 3. The acetylcholine content in the blood of dogs was almost undetermined by the biological method.

Thus on the basis of the data obtained, one can assume that removal of a large part of the pancreas influences to a significant degree the choline reserves in the organism, and thereby the formation of the mediator of acetylcholine.

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MECHANISM OF CARDIOTOXIC ACTION OF SOME INDUSTRIAL TOXIC AGENTS (METALS)

Moscow KARDIOLOGIYA in Russian No 5, 1978 pp 54-60

[Article by M. P. Chekunova, Institute of Industrial Hygiene and Occupational Diseases (director: A. I. Semenov, doctor of medical sciences), Leningrad, submitted 18 May 76]

[Text] Cardiac pathology induced by chemicals is presently one of the pressing problems of medicine, in view of the use of chemistry in various branches of industry, as well as environmental pollution by chemicals. Many clinical and experimental studies have shown that chemicals varying in structure and action may play an etiological role in development of cardiovascular pathology and predispose or accelerate development of diseases of the vessels and heart [5, 9, 10, 17].

Metals constitute a large group of toxic agents capable of inducing various forms of cardiovascular pathology, particularly mercury, chromium, lead, cadmium, vanadium, cobalt, nickel and others [8, 19, 22, 24, 29].

The influence of metals on the myocardium is of great interest, not only in view of increasing use thereof in industry, but the possible intake of metals with water and food [13]. Lead presents a particular hazard, due to the fact that atmospheric air, soil and water are significantly polluted by it [34, 36].

Some metals, for example cobalt, induce predominantly cardiac pathology. Severe cardiac lesions, with development of signs of insufficiency and a high death rate, are observed in cases of cobalt poisoning, since it is added to beer, as well as due to industrial use thereof [31, 33, 40, 44].

The question of effects of chemicals, in particular metals, on the myocardium has not been sufficiently investigated. Our objective was to study the mechanisms upon which injury to the myocardium by toxic agents is based. For this purpose, we created a model of cardiac lesion induced by metals that have a cardiotoxic action (cobalt, lead, antimony). In this article, we submit the results of testing the acute and repeated effect of metals on myocardial metabolism, including their effects on catecholamine metabolism and activity of organelle-specific enzymes, acid lysosomal hydrolases.

Table 1. Changes in catecholamine content after single and repeated administration of cobalt, lead and antimony (M₁m)

Metal		Animal group	Number of animals	Index	Catecholamine content in					urine, ng/day	blood, µg/day
					myocardium, ng/g tissue		repeated injections		8-10 doses		
					acute administration	4-5 doses	4-5 doses	8-10 doses			
Cobalt	Experim. Control	7	NE	292,0±15,0	197,5±12,9	36,6	234,0±24,6	13,3±2,3			
	Control	6		218,6±13,4	248,6±27,0	248,6±27,0	173,0±15,2	3,8±0,6			
	Experim. Control	7	E	41,1±4,3	48,7±6,3	89,8±8,4	122,0±17,5	6,4±1,5			
	Control	6		41,6±4,2	58,0±7,5	58,0±7,5	108,0±10,3	0,84±0,6			
Lead	Experim. Control	6	NE	>0,5	0,5>p>0,25	0,05	>0,5	0,01>p>0,002			
	Control	6		108,0±13,5	160,9±12,4	—	831,0±68,0	16,7±3,3			
	Experim. Control	6	E	289,0±14,3	289,0±14,3	—	488,0±31,1	4,2±0,8			
	Control	6		<0,001	<0,01	—	<0,001	0,01>p>0,002			
Antimony	Experim. Control	6	NE	16,4±2,7	16,9±3,4	—	236,0±15,4	4,6±0,7			
	Control	6		20,6±3,4	16,5±3,8	—	132,0±14,1	0,94±0,08			
	Experim. Control	6	E	0,5>p>0,25	>0,5	—	<0,001	<0,001			
	Control	6		279,0±18,6	114,2±16,8	—	933,0±120,0	37,2±6,8			
	Experim. Control	6	NE	244,0±11,2	306,0±28,1	—	348,0±70,0	4,6±0,9			
	Control	6		>0,5	<0,002	—	<0,002	<0,001			
	Experim. Control	6	E	17,0±3,7	27,4±3,8	—	212,0±13,3	7,9±3,3			
	Control	6		22,5±3,5	22,1±5,6	—	146,0±12,4	0,76±0,05			
	Experim. Control	6	E	0,5>p>0,25	>0,25	—	0,01>p>0,002	<0,05			
	Control	6									

Key: NE) norepinephrine E) epinephrine

Material and Methods

Hypodermic injections of cobalt and lead, in the form of acetates of these metals, and antimony trioxide were given once and repeatedly to male albino rats weighing 250-300 g. In the acute experiment, where one injection was given, we tested the effects of large doses of these products (cobalt, lead and antimony in doses of 20, 50 and 360 mg/kg, respectively, which constitutes about one-fifth of LD₅₀). In the case of repeated injections (for 5 and 9 days), we tested the effects of 5 times smaller doses of these toxic agents.

We assayed catecholamines of the myocardium, blood and urine by the trioxyl-indole method [37] in the modification of E. Sh. Matlina and T. B. Rakhmanova [14]. We used a modification of the Cori method [7] to determine glycogen phosphorylase activity of the myocardium, which enabled us to demonstrate overall activity of the enzyme and its forms (active *a* and inactive *b*). The method of Sevela and Tovarek [43], in the modification of B. F. Korovkina [11] was used to determine lactate dehydrogenase activity in the myocardium and blood serum. Pyruvic acid content of the myocardium was assayed by the method of Freedemann and Haugen [39], lactic acid was assayed by the method of Barker and Summerson [32] and glycogen, histochemically by the method of Glenner [39]. We monitored these indices in the acute and chronic experiments.

Changes in activity of acid hydrolases--cathepsins and acid phosphatase--in the myocardium were demonstrable for several days after single injections of large doses of metals. Homogenates were prepared in 0.25 M saccharose solution containing 0.001 M EDTA to an end dilution of 1:5 (weight/volume). Homogenization was performed in a glass homogenizer with a teflon pestle (2 min by hand and 1 min with the motor at 1000 r/min). We determined two forms of enzyme activity: free activity in the supernatant obtained after centrifugation of homogenates at 20,000 G for 20 min and bound activity in the lysosome-rich fraction. This fraction was isolated by means of differential centrifugation.

Cathepsin activity was estimated spectrophotometrically and acid phosphatase, by the photolorimetric method; crystalline hemoglobin and p-nitrophenyl phosphate were used as substrates [20]. All of the indices were compared to controls assayed at the same times.

Results and Discussion

The experimental results revealed that there is very rapid change in norepinephrine of the myocardium under the influence of acute and chronic administration of the tested toxic agents. As can be seen in Table 1, a single injection of the metals induced changes after 1 day that were in different directions, with respect to mediatory content (elevation under the influence of cobalt, decline under the influence of lead and no changes after administration of antimony). Repeated administration of all toxic agents induced the same effect, which consisted of severe reduction in norepinephrine content of the myocardium.

Comparable changes in catecholamine content of blood and in excretion thereof in urine were induced by all the toxic agents. As can be seen in Table 1, there was a sharp (3-6-fold) increase in levels of both monoamines. There was also a substantial increase in excretion of these amines, particularly norepinephrine.

Intensification of glycogenolytic processes is one of the early changes in the myocardium induced by the metals, as indicated by such findings as activation of phosphorylase α and decrease in glycogen content (Table 2). The data listed in this table indicate that only the active form of phosphorylase undergoes a change, whereas overall activity of the enzyme does not change appreciably. These data are indicative of early onset of changes in myocardial metabolism. This is also indicated by the increase in pyruvic acid content of the myocardium. The pyruvate level rose both in the acute experiment (after 48 h) and with chronic administration of cobalt (7.95 ± 0.25 and 7.38 ± 0.4 $\mu\text{g/g}$ tissue after 48 h and 5 days, respectively, versus 5.33 ± 0.3 $\mu\text{g/g}$ in the control). At these times, there were negligible changes in lactic acid level.

Table 2. Changes in activity of phosphorylase and lactate dehydrogenase in rats submitted to the acute and chronic effects of cobalt ($M \pm m$)

Cobalt dose, mg/kg	Time of assay	Animal group	Myocardial phosphorylase activ. $\mu\text{g}/100 \text{ mg}$		Lactate dehydrogenase activity in	
			total	active form	myocard. $\mu\text{mole/g tissue/h}$	serum, $\mu\text{mole/ml blood/h}$
20	24 h	Exper.	446.8 ± 29.7 (6)	226.6 ± 13.9 (6)	304.4 ± 25.9 (14)	22.9 ± 3.3 (6)
		Control	481.8 ± 14.8 (6)	169.9 ± 13.3 (6)	436.5 ± 27.9 (20)	14.8 ± 0.9 (7)
		<i>p</i>	$0.5 > p > 0.25$	$0.02 > p > 0.01$	< 0.001	$0.05 > p > 0.02$
5	4 days	Exper.	414.0 ± 25.2 (6)	191.7 ± 11.9 (6)	283.9 ± 21.6 (7)	—
		Control	471.9 ± 20.5 (6)	175.9 ± 12.1 (6)	430.6 ± 38.7 (13)	—
		<i>p</i>	$0.25 > p > 0.1$	$0.5 > p > 0.25$	0.02	
	9 days	Exper.	456.0 ± 25.8 (6)	231.8 ± 12.2 (6)	327.7 ± 39.9 (8)	20.6 ± 1.6 (14)
		Control	412.6 ± 22.4 (6)	168.8 ± 17.9 (6)	436.6 ± 27.9 (20)	17.3 ± 1.0 (16)
		<i>p</i>	$0.5 > p > 0.25$	$0.1 > p > 0.05$	0.05	0.1

Note: The number of animals is given in parentheses.

Data indicative of a change in permeability of cell membranes were obtained only under the acute effect of large doses of metals. Thus, already after 1 day, we observed increased activity of blood serum lactate dehydrogenase and concurrent decrease in activity of this enzyme in the myocardium (see Table 2). Chronic administration of cobalt also induced a decrease in activity of myocardial lactate dehydrogenase, but did not lead to reliable changes in activity of this enzyme in blood serum.

The increase in free activity of lysosomal enzymes is indicative of the membrano-toxic effects of large doses of metals on cell organelles. The results of the experiments are submitted in Figures 1 and 2, and in Table 3, which show the dynamics of changes in free and bound cathepsin and acid phosphatase activity under the influence of cobalt and lead. The figures indicate that both cobalt and lead induced an increase in free activity of cathepsins at all observation times, more marked after 2 days. At this time, free activity of the enzyme reached 176 and 184% of control levels for cobalt and lead (respectively).

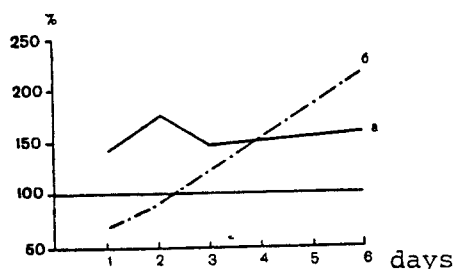


Figure 1.

Change in activity of myocardial cathepsins (% of control) under the influence of cobalt

a) free activity

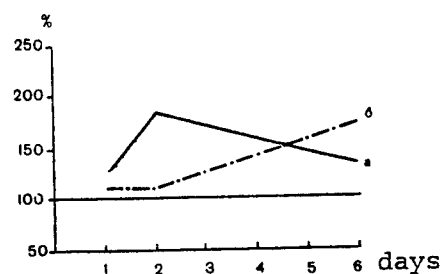


Figure 2.

Change in activity of myocardial cathepsins (% of control) under the influence of lead

b) bound activity

The dynamics of changes in bound cathepsin activity were different, and the activity of this fraction increased sharply after 6 days, with little change on the first few days of the experiment. Bound activity of acid phosphatase changed similarly.

The demonstrated biochemical changes were compared to structural changes in the myocardium. Morphological examination revealed substantial differences in severity of myocardial lesion. Large doses of metals led to gross destructive changes and formation of necrotic sites. Chronic administration of smaller doses was characterized by early signs of dystrophic changes in the myocardium.

The causes and effects of metal-induced changes are of interest. The use of pharmacological agents to determine the causes of decline in norepinephrine content of the myocardium warrants the belief that this effect is the consequence of interrelated processes, increased exit of mediator from the reservoir and deamination of liberated norepinephrine by monoamine oxidase. Administration of MAO inhibitor prevented the drop in norepinephrine level [27].

As shown by the experiments, the early changes observed under the influence of metals include an increase in catecholamine content of blood and urine, which is indicative of increased activity of the sympathoadrenal system.

Table 3. Changes in activity of acid phosphatase in the rat myocardium under the influence of large doses of cobalt and lead (M μ m)

Metal	Animal group	Number of rats	Acid phosphatase activity, μ mole/g tissue/min					
			free			bound		
			24 h	48 h	6 days	24 h	48 h	6 days
Cobalt	Experim. Control p	6 6	0,324 \pm 0,01 0,276 \pm 0,006 0,01>p>0,002	0,323 \pm 0,018 0,252 \pm 0,010 0,01>p>0,002	0,344 \pm 0,011 0,280 \pm 0,007 <0,001	0,228 \pm 0,009 0,226 \pm 0,007 0,5	0,230 \pm 0,010 0,194 \pm 0,004 0,01>p>0,002	0,246 \pm 0,010 0,214 \pm 0,009 0,05>p>0,02
Lead	Experim. Control p	6 6	0,241 \pm 0,01 0,243 \pm 0,006 >0,5	0,299 \pm 0,006 0,296 \pm 0,005 >0,5	0,256 \pm 0,007 0,226 \pm 0,002 0,02>p>0,01	0,238 \pm 0,02 0,232 \pm 0,015 >0,5	0,227 \pm 0,005 0,234 \pm 0,006 0,5>p>0,25	0,272 \pm 0,016 0,225 \pm 0,008 0,05>p>0,02

These changes corresponded to a decrease in glycogen content of the myocardium and activation of phosphorylase α . As demonstrated by Sutherland, cyclic 3',5'-adenosine monophosphate plays a substantial role in the mechanism of hormonal control of the process of glycogen dissociation. The increase in activity of the sympathoadrenal system and system of glycogenolysis, which we observed, is an indirect indication of increased production of cyclic AMP in the myocardium at the early stages of metal poisoning.

Intensification of glycogenolytic processes under the influence of the toxic metals could also be the result of impairment of oxidative processes. As we know, there is intensification of the glycolytic process under the influence of various factors that lead to impairment of oxidative conversion of substrates [2, 12, 15]. The data we obtained, as well as the literature, indicate that there is depression of oxidative processes in tissues under the influence of toxic doses of metals. Accumulation of pyruvic acid in the myocardium under the influence of cobalt may have been the result of impairment of the main route of its conversion, the oxidative route. It has been shown in several works that administration of cobalt into a biological system in vitro leads to accumulation of keto acids (pyruvic and α -keto-glutaric), which the authors interpret as the result of impaired oxidation thereof due to formation of a complex of cobalt with lipoic acid [35, 45, 46]. It was shown that there is also a decrease in intensity of oxidative processes in tissues in the presence of lead poisoning [4, 23].

The change in myocardial metabolism under the influence of metals could be one of the causes of increased membrane permeability, in particular lysosomal membranes, which we observed. It has now been shown that a decrease in intensity of energy metabolism in tissue leads to impairment of permeability of plasma membranes and organelles,

a result of which is passage of enzymes into the cytoplasm, intercellular space and blood [3, 11, 41, 42].

On the basis of the results we obtained and the information in the literature concerning the distinctive features of the toxic effect of metals, we can conceive of the following mechanism of their deleterious action on the heart: As we know, the effects of metals on the body are determined by their capacity to block functionally active protein groups, including enzymes, which leads to inhibition and change in function of many enzymes and coenzymes. Carboxyl, phosphate and, particularly, sulfhydryl groups are the chemical groups that metals bind with most often. The most vulnerable enzymatic systems to a number of metals, including cobalt that we tested, were identified: the dehydrogenase systems that decarboxylate and dehydrate keto acids [30]. The increase in levels of pyruvic acid, oxidized and reduced forms of nicotinamide adenine dinucleotides [25], intensification of processes of glycogenolysis are indicative of impairment of oxidative processes. Impairment of these processes, which are the main source of energy for the myocardium, may cause development of subsequent disturbances of myocardial metabolism and lead to a defective energy balance.

These changes may result in the increased liberation of catecholamines, which is observed under the influence of metals, for the deposition of which the energy of macroergic phosphorus compounds is required. In turn, impairment of catecholamine metabolism could aggravate the changes in myocardial metabolism and intensify injury thereof. At the present time, clinical and experimental studies have indicated the important and, in a number of cases, leading role of changes in catecholamine content and activity of the sympathoadrenal system in development of cardiac pathology under the influence of some factors, which is used as the basis in modeling focal metabolic lesions to the heart [1, 6, 16, 18, 21, 28].

Injury to lysosomes, which leads to passage of acid hydrolases into the cytoplasm and which is the result of impaired oxidative processes, may be the cause of expression of myocardial lesions in the case of acute metal poisoning. The question of the role of lysosomes in tissular injury in the presence of acute cardiac pathology has been investigated very little. Impaired permeability of lysosomal membranes is believed to play a substantial role in occurrence of myocardial lesion in the case of myocardial infarction and epinephrine myocarditis [42]. The authors related cellular destruction in the first few days of experimental myocardial infarction to lysosomal injury and migration of acid hydrolases into the cytoplasm. Focal lesions to myofibrils (myocytolysis) in the presence of epinephrine myocarditis are attributed to increased permeability of lysosomal membranes [26].

The obtained results indicate that disturbances referable to oxidative processes, catecholamine metabolism and increased membrane permeability, including lysosomal membranes, are involved in the mechanism of development of myocardial lesions due to metals. These data enable us to recommend the means of preventive and pathogenetic therapy of myocardial injury under the effect of toxic agents, which should be directed both toward normalization of myocardial

metabolism and increasing membrane stability, as well as accelerated elimination of metals from the organism.

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CHARACTERISTIC OF CEREBRAL CIRCULATION IN PATIENTS WITH CHRONIC NONSPECIFIC PNEUMONIA

Kiev VRACHEBNOYE DELO in Russian No 4, 1978 pp 23-26

[Article by V. A. Yezhova, N. P. Ieshchinskaya, and I. S. Cherfus, I. M. Sechenov Yalta Scientific Research Institute of Physical Methods of Treatment and Medical Climatology]

[Text] In recent years due to the increase in the morbidity with chronic nonspecific pneumonia the number has risen of different complications of the disease with pathology of the nervous and cardiovascular systems. Involvement in the process of the nervous system in various pulmonary diseases significantly aggravates the course of the disease (H. K. Bogolepov, 1967; N. A. Popova, 1967; Yu. S. Martynov, 1967, 1972; V. A. Yezhova, 1974).

Until the present the literature has not sufficiently reflected questions of the clinical-physiological justification of the essence of the revealed pathology on the part of the nervous system during chronic nonspecific pneumonia. There are only individual indications of the development in the chronic course of the disease of signs of interest in the diencephalic region, disorders in coronary circulation, symptomatic hypertonia, asthenization of patients, and others (V. L. Kaznacheyev, 1965; N. M. Ryabenkova, 1971; S. R. Tatevosov, 1971; A. Yu. Makarov, 1972; S. G. Yeramyán and Ts. S. Ayrapetov, 1972).

Timely detection of different disorders in cerebral circulation and diagnosis of neurological syndromes in such patients in the initial stage of the process is the basis for conducting comprehensive pathogenetic therapy, one of whose elements must be the use of physical and health resort factors (B. V. Bogutskiy, V. G. Boksha, 1973; V. A. Yezhova, 1974).

It is known that disorders in the functional state of the central nervous system to a significant measure depend on changes in cerebral circulation which in turn is anatomically and physiologically related to pulmonary hemodynamics. Therefore in patients with chronic nonspecific pneumonia a study was made of cerebral circulation and its dynamics under the influence of comprehensive health resort and climate treatment on the southern coast of the Crimea.

Observations were made of 11 patients that were being treated in the pulmonological department of the Yalta I. M. Sechenov Scientific Research Institute. A general clinical, x-ray, and laboratory study of the patients was supplemented with rheoencephalography (REG) and ophthalmodynamometry conducted before and after a course of sanatorium-climate treatment.

REG was conducted with the help of a two-channel rheographic attachment of L. A. Arnautov's system with generator frequency 120 kHz. The rheoencephalograms were recorded at the points of contact: hemispheres (fronto-mammillary) encompassing the basin of the common carotids, and in the vertebro-basilar that characterize the system of vertebral arteries. Ophthalmodynamometry was conducted with the patient in the sitting position by the ophthalmodynamometer of the plant "Krasnogvardeyets" in direct ophthalmoscopy.

Besides measurement of the patient's arterioretinal (systolic and diastolic) pressure (ARP) a study was made of the ophthalmotonus, a determination of blood pressure on the shoulder, and a computation was made of the retinobrachial index (RBI), the average dynamic arterioretinal pressure, and the balance of feeding of the retina according to the Lobshteyn index (1960).

In the analysis of the actual material we were oriented on the amounts obtained from healthy people in the I. M. Sechenov Institute, according to which the diastolic blood pressure in the arteries of the retina averaged 36.5 mm Hg, and systolic--72.1 mm Hg; RBI equalled respectively 0.51 and 0.57. For the normal amount of balance of feeding of the retina determined according to Lobshteyn's index data were taken that corresponded to 32.6 ± 4.8 mm (according to G. S. Palamarchuk, 1968). The patients had comprehensive treatment including climate, physiotherapy, and medication.

Analysis of the REG made before treatment in 97 patients indicated that the anacrotic phase was within the limits from 0.07 to 0.25 sec, including from 0.07 to 0.11 sec--in 60 patients, from 0.12 to 0.16 sec--in 14, and over 0.16 sec in 23. In 73 patients the REG had sharpened heights, while in 24--rounded, hump-shaped, and less often plateau-shaped. On the catacrotic section in 71 patients a dicrotic projection was defined that was shifted to the base, and in 23--an analogous projection shifted to the height.

The amplitude characteristics of the REG in the majority of patients (76) were within the norm (0.1-0.2 ohm), and in 21 patients a tendency towards hypervolemia was observed.

In an analysis of the REG depending on the stage of disease more often a disorder was found in the vascular tonus during chronic pneumonia of the second stage (in 57 of the 65, which comprised 88%). Here the hypertonus was defined in 15 (24%) of the patients, hypotonus--in 42 (64%). Of the 34 patients of the first stage of the disease disorders in vascular tonus were found in 22 (68%), here hypertonus was observed in 8 (24%) of the patients, and hypotonus in 14 (44%).

Thus, in 79 (81%) of the patients with chronic nonspecific pneumonia the method of rheoencephalography reveals disorders in tonus of the cerebral vessels with dominance of hypotonus and a tendency towards venous encephalopathy. These changes are found primarily in the vertebrobasilar system, and in the second stage of the disease.

Intraocular pressure before treatment in all the patients was within the norm, and comprised 18.8 ± 0.16 mm Hg. The arterioretinal pressure (ARP), the systolic in the majority of patients (77 of 110) was reduced, and equalled 60.6 ± 1.22 mm Hg; the diastolic (ARP) was defined as disrupted in 75 of the patients (increased in 18, lowered in 57), and on the average was 30.3 ± 0.78 mm Hg. The mean dynamic arterioretinal pressure equalled 41.6 ± 1.00 mm Hg. The amount of the balance of feeding the retina was below the standard (22.7 ± 0.83) in the overwhelming majority of patients. Arteriobrachial systolic pressure was 113.1 ± 1.68 mm Hg, and diastolic-- 71.0 ± 0.93 mm Hg.

The disrupted retinobrachial index for systolic pressure was determined in 43.5% of the patients (increased in 21%, and lowered in 22.5%). On the whole its amount before treatment was reduced and was 0.47 ± 0.01 . An analogous index for diastolic pressure corresponded to the norm in 39% of the patients, and was defined as increased in 6%, decreased in 55%. On the whole its amount equalled 0.41 ± 0.01 .

Here the normal amounts of ARP (both systolic and diastolic) are more often determined in patients with chronic pneumonia of the first stage in which disorders in the function of external respiration are lacking, or they are not sharply pronounced (RD_0 and RD_1), while the disrupted (increased or more often decreased)--in patients with chronic pneumonia of the second stage and in the presence of marked respiratory deficiency (RD_{II-III}).

Thus, in the first stage of the disease ARP disorders were defined in 63% of the patients, and in the second stage--in 75%. In patients with RD_{0-I} ARP disorders were found in 60%, and with RD_{II-III} --in 93%.

Thus, as a result of the ophthalmodynamometry conducted before treatment in the majority of patients regional cerebral hypotonia and a reduction in the balance of feeding the retina were found. These data confirm the presence in the patients with chronic nonspecific pneumonia, especially of the second stage with disruption in the respiratory function, of changes in cerebral hemodynamics revealed by the method of rheoencephalography.

After a course of comprehensive treatment the number of patients with altered tonus of the cerebral vessels (according to the REG data) was decreased from 79 to 43, whereby, 32 (33%) patients had hypotonus, and 11 (11.4%) had hypertonus. In 54 (55%) of the patients the tonus of the cerebral vessels was normal. A noticeable dynamics in the REG amplitudes was not successfully observed.

With repeated ophthalmodynamometry conducted before the release of the patients from the department a tendency was found towards normalization of both the systolic and diastolic ARP, primarily in patients with increased amounts determined before treatment. Thus normalization of systolic ARP occurred in 67% of the patients, and of diastolic--in 64%. Reduced ARP (systolic and diastolic) was normalized respectively in 18.3 and 18.0% of the patients. The average amounts of RBI, ophthalmotonus, and balance of feeding the retina remained without significant changes. Normalization of RBI for systolic pressure occurred in 11.0% of the patients, and for diastolic--in 10%; the balance of feeding the retina--in 7.3%.

The amount of ophthalmotonus after treatment was 18.4 ± 0.17 mm Hg. The RBI for systolic pressure-- 0.53 ± 0.01 ; for diastolic-- 0.40 ± 0.01 ; the balance of feeding of the retina-- 23.7 ± 0.89 .

Thus, the results of the conducted studies indicate the development in patients with chronic nonspecific pneumonia of disorders in cerebral circulation of the regional cerebral hyper- or more often hypotonic type, reduction in tonus of the cerebral vessels, and balance of feeding the retina. These changes are more often defined in the second stage of the disease and with a disruption in the external respiratory function.

Comprehensive health resort treatment with the use of climate and physiotherapy procedures has a favorable effect on the course of the process, and promotes an improvement in the cerebral circulation, especially for symptoms of regional cerebral hypertonia. The course of regional intracranial hypotonia and venous encephalopathy found in the majority of patients with chronic pneumonia, is more torpid and responds more slowly to corrective therapy.

The direct dependence found in patients with chronic pneumonia of the condition of cerebral circulation on the severity of the main disease and the degree of disorder in the respiratory function indicates the disorders in the correlation between the higher sections of the central nervous system and its subcortical formations that regulate the functioning of the respiratory and cardiovascular systems. This should be taken into account when prescribing comprehensive treatment for the indicated patients.

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EPIDEMIOLOGY

UDC 616.921.5-036.2-071(477.41)"1969-1977"

LABORATORY DIAGNOSIS OF INFLUENZA DURING THE PERIOD OF 1969-1977

Kiev VRACHEBNOYE DELO in Russian No 4, 1978 pp 136-139

[Article by T. P. Yatel', Laboratory of Influenza Diagnosis and Acute Respiratory Diseases of the Kiev Scientific Research Institute of Infectious Diseases of the Ukrainian SSR Ministry of Public Health]

[Text] In Kiev, starting in 1969 when the A type virus was first discovered of a new Hong Kong variety and up to the present the epidemic situation has been characterized by considerable intensity--in 8.5 years nine major influenza epidemics have been recorded.

The task of this work was to study the influenza in the course of 1969-1977 by laboratory methods. The characteristic of the influenza process in different periods was considered according to intensive indices of morbidity for influenza and acute respiratory viral infections (according to the data of the Kiev GorSES [city sanitary and epidemiological station]).

Determination of the degree of participation of the influenza pathogen in the etiology of ARVI (acute respiratory viral infection) during the entire period of observation (both during the epidemics, and in the interepidemic period) was conducted by means of comprehensive laboratory examination of ARVI patients that were in the influenza clinic of the institute, and individual foci of acute respiratory diseases in Kiev.

In order to reveal the influenza pathogen washings from the patients' mouths were subjected to virological study on chick embryos, and also were studied in a reaction of microelectrophoresis--MEP (the studies were conducted jointly with V. N. Sereda).

To identify the freshly isolated strains immune sera of animals were used which were prepared for international viral references of the types A and B, as well as sera for strains isolated in Kiev during the previous epidemics.

Paired sera of patients were studied in RTGA [hemagglutination-inhibition test], whereby special attention was given to a careful selection of antigens whose composition was renewed during each epidemic governed by a new variant of pathogen of both types.

With timely selection of antigens for serum diagnosis first of all an investigation was made of the antigen structure of hemagglutinin in cross tests of hemagglutinin inhibition and antibody adsorption, in reactions of bonding the complement and neutralization, as well as by the immunological method on the basis of differentiation of different classes of antibodies for the strains of influenza virus isolated during all the epidemic rises.

In order to obtain inhibitor-resistant variants a selection was made of freshly isolated type A strains. During the entire period of study 2459 virological studies were made, and 351 strains of influenza virus were isolated (14.3%), of them 299 strains of type A (12.2%) and 52--type B (2.1%).

During the 9 epidemic rises 1108 virological studies were made, and 335 strains were isolated which comprised 30.2% positive results. Here in the period of epidemic rises governed by influenza virus type A the virus was isolated in an average of 40% of the studies, while during outbreaks of type B--in 11.3%.

The results of the identification, and precisely the type affiliation and nature of the antigen variants of the influenza viral strains isolated during the nine epidemics which occurred in Kiev in the observation period are presented in the table.

With the use of the microelectrophoresis method during three A epidemics (204 studies) a positive result was obtained in 50% of the cases and more.

The serological method was used during the entire period to examine 5707 ARVI patients, and positive seroconversions were recorded in 1012 cases (18%). In the period of the nine epidemic rises 1987 studies were made, and a diagnostic increase in titer was established in 852 cases (42.9%). In the period of type A epidemic rises positive seroconversions occurred in an average of 43.1%, and during epidemics of type B--in 40.4% of the cases.

Inclusion in the serum diagnosis as antigens of strains belonging to the new variants of pathogens we isolated increased the number of positive seroconversions during the type A influenza epidemics by 5.0-8.7%, and epidemics of type B--by 7.0-8.9%.

On the basis of the findings it was proved that the laboratory diagnosis of influenza during the entire period of the viral spread of the Hong Kong variety is characterized by the high efficacy of using the virological method only during epidemics of type A (up to 55-64% positive results in individual months of the epidemics).

At the same time in serological studies, regardless of the type of epidemic pathogen, positive seroconversions were recorded up to 60-78% in individual months of the epidemic rises.

(1) Период эпидемии (год, месяцы)	(2) Тип вируса	Срок между двумя последовательными эпидемиями одного типа (3)		*
		A	B	
I—IV 1969	A	—	—	A/Гонконг/1/68 (H ₃ N ₂) (9)
I—III 1970	A (4)	9 мес.	—	A/Гонконг/1/68 (H ₃ N ₂) (9)
XII 1971—I 1972	A (5)	1 год 8 мес.	—	A/Гонконг/1/68 (H ₃ N ₂) (9)
XII 1972—I 1973	A (6)	год	—	A/Виктория/35/72 (H ₃ N ₂) (10)
XII 1974—I—II 1975	A (7)	2 года	—	A/Порт/Чалмерз/1/73 (H ₃ N ₂) (11)
I—III 1976	A (6)	1 год	—	A/Виктория/3/75 (H ₃ N ₂) (10)
II—III 1972	B	—	—	—
II—III 1974	B	— (7)	2 года	— В/Гонконг/5/72 (12)
XII 1976—I 1977	B	— (8)	2 года 9 мес	— В/Гонконг/7/75 (12)

*Note: The names of the international references of new variants of influenza virus types A and B to which the strains corresponded that were isolated in the indicated periods in Kiev.

Key:

- | | |
|--|---------------------|
| 1. Period of epidemic (year, month) | 8. 2 years 9 months |
| 2. Type of virus | 9. A/Hong Kong |
| 3. Time between two successive epidemics of one type | 10. A/Victoria |
| 4. 9 months | 11. A/Port/Chalmers |
| 5. 1 year 8 months | 12. B/Hong Kong |
| 6. 1 year | |
| 7. 2 years | |

During the entire interepidemic periods during which the influenza morbidity was mainly sporadic 1299 virological studies were made, and 16 strains of influenza virus were isolated, that is the average separability of the pathogen equalled 1.2%. According to the serological studies (3720 paired sera) conducted during these intervals in the interepidemic time of different years influenza comprised from 2 to 6.1% of the ARVI. Altogether for the entire period of study positive seroconversions were documented in 4.3% (160 observations), whereby type A influenza comprised 2.4%, type B--1.6%, and type C--0.3% of the cases.

Distribution of the influenza diseases in the course of all the interepidemic periods was not uniform; a considerable portion of the cases documented by laboratory methods were recorded in the course of the first two interepidemic periods, that is in the period of the dominance of the first strain variant A (Hong Kong) 1/68. At this time influenza was diagnosed by virological methods in 3.2% of the cases, and by serological in 5.8%. Beginning in 1972, that is from the moment of the appearance of the next antigen variant of the virus of the Hong Kong variety, and during all the remaining periods cases of influenza were successfully defined less often; they averaged 0.4% of the virological and 3.1% of the serological findings.

During each interepidemic period the minimum number of cases of influenza was recorded in spring and summer. A doubling of the number of influenza cases in this period (in March-May 1971 and June 1976 up to 6-8% positive seroconversions) was an indication of major epidemic waves of type B influenza that occurred within several months in 1972 and 1976-1977 respectively.

As a result of the conducted laboratory studies the etiology was established and the antigen nature was determined of the hemagglutinin of the variants that governed nine major influenza epidemics in Kiev, and the length of each of them was pinpointed. As is apparent from the data of the table the etiological factor in six of the epidemic rises was virus A (Hong Kong) 1/68, and its three successively appearing variants, three epidemic waves--different antigen variants of the influenza virus type B.

The epidemics both of type A and B that occurred in the period of dominance of the Hong Kong variety of virus were characterized by considerable time duration: of the six epidemics of type A two lasted two months each, three--three months, and one--about four months; all three type B epidemics--two months each. Altogether for the 8.5 years of observation the epidemic rises comprised 23 months, that is on the average for a year this index equalled 2.7 months. In an analogous calculation made for the period of dominance in Kiev of the Asiatic variety of virus A (1957-1968) it was found that on the average the annual epidemic level of morbidity was roughly a month.

The second characteristic feature of the influenza process during the period we studied was a reduction in the extra-epidemic intervals between individual epidemic waves. Thus, if in the era of the domination of the Asiatic influenza virus the interepidemic periods between two waves of type A influenza mainly comprised 2-3 years, while, as is apparent from the data in the table, during 1969-1977--in the period of the dominance of the Hong Kong virus--of the five periods free of epidemic rises only one was equal to 2 years, and the others were considerably shorter--from 9 months to 1 year 8 months. Very important was the fact that data of an analogous nature were also obtained in type B influenza. Processing of materials for the previous 20 years indicated that if from 1949 through 1968 in Kiev 5 B influenza epidemics were recorded that occurred with intervals of 4-5 years, then only in the past five-year period three outbreaks of type B influenza occurred. The interepidemic interval between these three outbreaks, as is apparent from the data of the table, in both cases was less than 3 years.

The indicated two peculiarities of the influenza process, as we assume, can serve as proof of its intensification in recent years. As a consequence of the lengthening of the actual epidemic rises of influenza and the shortening of the periods of interepidemic time between them, the impression is created that influenza morbidity to a certain measure is acquiring a more permanent nature.

The materials presented on a study of influenza in the period of the dominance of the Hong Kong variety of virus indicate the presence of a marked relationship between the appearance of variants with altered antigen structure, in particular with restored antigen structure of hemagglutinin and the emergence of epidemic outbreaks governed by viruses both of type A and B.

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GENETIC PROBLEMS AND QUESTIONS OF POSSIBILITY OF PATENTING ACHIEVEMENTS
IN THE FIELD OF MICROBIOLOGY

Moscow ANTIBIOTIKI in Russian No 5, 1978 pp 446-449

[Article by V. I. Korovkin and Yu. E. Bartoshevich, All-Union Scientific Research Institute of State Expert Patenting and All-Union Scientific Research Institute of Antibiotics, Moscow, submitted 31 Aug 77]

[Text] The ever increasing economic importance of strains of microorganisms with mutant hereditary properties is not only drawing attention to the question of increasing the reliability of legal protection of inventions in the field of microbiology, but also touches upon the question of possibility of patenting genetic processes.

While several publications have appeared in recent years, dealing with legal protection of inventions in the field of microbiology [1-8], the distinctions related to protection of genetic processes have not been discussed in the Soviet literature.

In our country, methods of obtaining strains of microorganisms are included in the realm of legal protection, as certified in item 11.06 of the Instructions on state scientific and technical expert certification of inventions, E3-2-74 [9].

It is interesting to discuss the distinctive factors that arise in protecting genetic processes as inventions, especially in view of the fact that item 1,16 of the above mentioned Instructions E3-2-74 specifies that the possibility of repeated reproduction is mandatory for any invention.

Genetic processes can be arbitrarily divided into two groups: 1) actual methods for experimental production of mutants, consisting of treating the genetic system of a microorganism directly with mutagenic agents; 2) methods of isolating spontaneous and induced mutants, which consist of creating conditions for the detection of a specific type of mutant with the required characteristics.

When dealing with the method of obtaining a specific mutant with the use of a specific mutagen or treatment, apparently there is no assurance that the author himself or another researcher will succeed in obtaining an identical

mutant using the original method. In this case, the specific treatment conditions and mutagen cannot determine the nature of changes in genotype, since no clearcut specifics could be traced in the nature of mutation changes. Moreover, theoretically, it can be maintained that a specific, analogous mutant strain could be obtained as a result of treating the original strain with another mutagen. Consequently, there is no stable cause and effect relation between the use of a mutagen or conditions of mutagenic treatment and nature of induced hereditary changes. The appearance of a specific strain of a microorganism as a result of treatment with a mutagen is a chance event, and the probability of obtaining the same mutant a second time is only theoretically possible, and it is determined exclusively by statistical laws.

For this reason, the method of producing a specific mutant is repeatable with theoretically negligible probability, and the mutant could be obtained not necessarily by the described method, which precludes recognition of the proposed method as an invention.

"Repeatability" of the method refers to the possibility of obtaining the mutant again as a result of a specific mutagenic treatment. The fact that the obtained mutant is capable of autoreproduction of the genome, i.e., that it is identical after self-reproduction for a number of generations, is not indicative of repeatability of the method in the above-indicated sense.

Similarly, the method of obtaining mutants of a specific group of microorganisms cannot be recognized as an invention, if it amounts to treatment of the original strain with known mutagenic factors or combinations thereof. Refusal to recognize such a method as an invention may be based on the lack of substantial novelty therein, since the method would be based on a known level of knowledge, and the effect obtained from treating base strains of a specific taxonomic group would not differ from the effect that could be obtained when the base strains of microorganisms of other groups are treated; in both cases mutants would be obtained that differ from parental cultures in a number of characteristics.

At the same time, when an original general method is created to induce mutants by means of physicochemical factors, i.e., when a method is developed to affect the genetic mechanisms of a microorganism that guarantees a yield of mutant strains with genetically altered properties, which is superior to existing methods of mutagenic treatment, such a method could claim the right to recognition as an invention.

In this regard, it should be noted that detection of a new chemical mutagen, the use of which does not yield a better result than the effect obtained with previously discovered mutagens, is not of any special interest, since we know of thousands of chemical compounds with mutagenic action, and various factors do not manifest strict specificity with regard to the nature of phenotypical changes.

Consequently only original methods leading to a change in the genome of microorganisms in general and which, for expressly this reason, can be deemed repeatable, can be recognized as eligible for protection.

With reference to another group of genetic processes, methods of isolating mutants, the following considerations apply: As a result of cultivating a base strain under specific adverse conditions, prolonged passages through living organisms and incubation in the presence of a toxic compound selective conditions are created for predominant development of a spontaneously appearing mutant, which is the most resistant to the listed factors. When these processes take place many times, the quota of mutant strain in the population increases and the developed culture as a whole acquires characters that are not inherent in the original culture.

Quite often, when such a culture is transferred to the original cultivation conditions, the newly acquired characters are lost as a result of predominant development, under these conditions, of original specimens and depression of reproduction of mutant cells.

A strict distinction must be made between phenotypical (modifying) and genotypical adaptation. Modifying adaptation is not associated with hereditary changes, and it is limited to the range of normal reactions of the genotype.

The possibility of singling out a genotypically adapted culture is determined by the presence in the original population of a mutant that is capable of developing under specific, selective conditions.

When an attempt is made to repeat the process of isolation of such a mutant, the result may be analogous, since, theoretically, there may be either several independently occurring stable mutants or genotypically related cells of the same clone in the original population.

Two strains of a microorganism can be judged identical only if it is established that the nature of changes in their genetic characters, as compared to the original strain, is the same and this is due to the same nature of changes in the structure of a nucleotide of the same site, the possibility of demonstration of which is ruled out at the present time using existing methods, with regard to most microorganisms of practical value.

Consequently, the method of isolation of mutant strains is not repeatable, in the sense of isolating a specific mutant, but it can be considered repeatable in the sense of possibility of isolating mutants with the same function. For this reason, the general method of isolating mutants with a specific functional capacity, which would meet the criterion of novelty, could be recognized as an invention.

This also applies in full to the instance where we are dealing with isolation of specific spontaneous mutants from natural habitats of microorganisms.

The producer of the antibiotic, tyrothricin, isolated from soil by Dubeau, which is active against staphylococci, was found to be so active that it was used directly for commercial production of tyrothricin in the United States, without conducting experimental breeding [10].

As a rule, media that are the most favorable for growth are used when isolating a specific group of microorganisms from natural substrates. The extreme cultivation conditions, which could induce hereditary changes, are not created here, so that the isolated cultures are in essence natural "wild" strains that exist in nature. For this reason, we cannot agree with the opinion that "variants of a natural strain are obtained when strains are isolated from natural substrates" [11].

When variants were discovered, as a result of continued breeding, in which some required properties are more marked, which are expressed in the course of making practical use of the strain, we are actually dealing with a spontaneously occurring mutant, selected from the initial population of the "wild" strain. In this case, there was no process involved to obtain this mutant, since no conditions were provided to directly treat the genetic material of the original culture.

With reference to the patentability of strains of microorganisms and tending to agree that direct protection thereof is not desirable, I. E. Mamiofa remarks that one of the causes is that the description of a strain adopted in the invention form includes cultural and morphological characters, which are usually not the cause of its useful properties, but are merely concomitant to the latter and cannot serve to disclose its substance [12]. That author further indicates that the advances in modern biology make it possible to decode, on the molecular level, some substantial traits of an organism, which predetermine the presence of specific properties.

Most quantitative characters, for example antibiotic production, depend on the function of the polygene system. For this reason, consideration of appearance of a new property as the result of changes only in the sequence of nucleotides of nucleic acids means that this property is considered apart from genomal function as a whole, and this is unquestionably unjustified. The causes inducing appearance of a trait have a complex mechanism, and the cause and effect link between changes in the genome and appearance of a special property is merely an external manifestation.

Bearing in mind the conventional conception of gene function through the DNA--RNA--protein system, which is affected both by the system of gene interaction and environmental factions, it should be conceded that the link between increased synthesis of an enzyme and change in a specific segment of nucleic acid is not direct, but merely concomitant.

For this reason, we consider it premature, at the present time and the immediate foreseeable future, to discuss the possibility of demonstrating the essence of a specific strain by modern scientific methods, if this refers to demonstration of specific, tangible substances of an organism and the specific properties of this organism.

In this regard, it may be concluded that the morphological traits of a strain, which I. E. Mamiofa considers to be associated with specific properties of a microorganism, are concomitant to the same extent as the traits that are

expressed, for example, on the chromosomal or molecular level, since they coincide only externally, in some cases, with changes in properties of the microorganism, but are not the cause of these changes for them to be considered traits of the "essence" of the strain of microorganism in the above-mentioned sense.

The existence of a relative correlation between some traits of microorganisms and useful properties makes it possible, in a number of cases, to address oneself to such traits in selecting the required strains. In principle, when a correlation of this kind is discovered for the first time and practical recommendations are offered on the basis of a demonstrated pattern, the use of which leads to a useful result, such a proposal may be considered an invention.

In this case, factual data must be submitted to confirm the newly demonstrated relationship and advantages of the proposed method, as compared to known prototypes. In such a case, the beneficial effect may consist of simplifying or accelerating the process of preliminary selection if, for example, unlike a known method, it does not require total checking of many mutant clones.

Thus, a consideration of questions related to validity of protecting a number of objects in the field of microbiology from the standpoint of genetics enables us to offer some recommendations, which should be taken into account when preparing applications for an invention, as well as when considering it for the purpose of issuing an author's certificate.

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NEUROSCIENCES

ELECTRORECEPTORS IN MAN AND OTHER ANIMALS

Moscow ZDOROV'YE in Russian No 4, 1978 pp 12-13

[Article by O. B. Il'inskiy, doctor of biological sciences, Leningrad:
"Sixth Sense Organ?"]

[Text] One of the distinctions of highly developed organisms, as compared to beings on lower steps of the evolutionary ladder, is a better capacity to perceive information by means of diverse receptors, to react to it in a more refined and diverse way. As we know, different organisms have sense organs and various types of sensory nerve endings, mechanoreceptors, chemoreceptors, photoreceptors and others, for the perception of all biologically important stimuli. In the last few decades, investigation of their functions acquired theoretical and practical importance. Among the most important advances in this field, we should mention the discovery of a new type of system in vertebrates, which is specifically sensitive to electric stimuli, i.e., electroreceptors.

The world in which we live is permeated with electromagnetic waves and fields that carry information which is important to living organisms. For expressly this reason, scientists have long since assumed that animals may have special sensitive structures, adapted to perceive electromagnetic stimuli. Thus, as far back as 1900, the famous Russian physiologist, V. A. Danilevskiy, wrote: "The life of organized beings unquestionably proceeds in an extensive charged condenser, consisting of the atmosphere and earth. Animals are subject to the influence of oscillating electric and magnetic fields under various physicocosmic and earth-based conditions. Just how these effects occur and with what they are demonstrable are questions of general physiology that will only be answered in the future; for the time being, it is sufficient to recognize the possibility of such influences. It would be best of all to search for special systems for the perception of such electrical stimuli in the nervous system of the integument."

This is where, 'in the "integument" of fish (within the so-called acoustico-lateral system, or system of hearing and lateral line), that the English researcher, Lissman, first discovered electroreceptors, 60 years after the prediction of Danilevskiy.

From the methodological point of view, it is the most convenient to study electroreceptors on fish such as the shark and ray. The fact of the matter is that they are very sensitive to electrical and magnetic factors, including potentials induced by the muscular movements of their prey. The structure of these specialized nerve elements in fish enables us to divide them into two main types, ampullar and nodular [tubercular].

The length of the ampullae and canals thereof reaches dozens of centimeters in some fish, whereas in others it is measurable in microns. In all cases, the canal and ampulla are filled with a gelatinous substance with high electroconductivity, whereas the ampullar walls are notable for very high resistance. For example, it is 60 times higher than the resistance of an excellent insulator, such as the myelin sheath of nerve fibers. Because of this structure of the ampulla and ampullar canals, electrical current entering them passes virtually entirely through sensitive cells at the base of the ampulla. For this reason, such "sensors" are capable of picking up even the most infinitesimal difference in potentials in the environment. Current of 10^{-11} A/cm², or even less, is sufficient to excite some electroreceptors. The receptor cells of ampullar organs, which structurally resemble sensory cells of the ear and its vestibular system, have special hairs at the apex.

Electroreceptors of the nodular type have neither ampullae nor canals filled with gelatinous substance, nor hairs. The sensory cells are directly at the apex of support cells, and their bodies lie freely in the spaces bordered by both these and other support cells of surrounding tissue.

The receptor cells transmit perceived information to ramifications of sensory nerve fibers, and there are always more of the former than the latter. For this reason, a nerve fiber, as it branches, may end on hundreds of electroreceptors, which enables it to summate extensive information. In addition, the nerve fibers connected to receptors are rather large in diameter, and they are covered with an insulating myelin sheath. These two circumstances provide for rapid transmission of nervous impulses to the central nervous system.

There is a curious exception: so-called efferent fibers, through which continuous regulation of receptors by the central nervous system is usually implemented or, in the language of neurocybernetics, feedback occurs, do not go to the electroreceptors. Just why expressly electroreceptors have no feedback is a question that physiologists cannot yet answer.

Functionally, electroreceptors are divided into tonic and phasic. As a rule, the ampullar ones are tonic and respond with a continuous flux of impulses for as long as a stimulus is active. The nodular receptors are more often stimulated only at the first stage of action of a stimulus. Moreover, there are many electroreceptors with continuous, or background activity. For this reason, the central nervous system can readily assess the action not only of excitatory, but inhibitory stimuli, according to inhibition of background activity. Let us recall that the variegation of excitation and inhibition determines all of the multifaceted activity of the nervous system and, consequently, of the organism as a whole.



В Институте высшей нервной деятельности

The effects of a traveling pulsed magnetic field on the human body are studied at the Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences

Apparently, all of these distinctions create the extremely diversified pattern of impulsation responses of electroreceptors. It can be maintained that the most diverse means of transmission of information, coded in impulses, from the periphery of an organism are inherent expressly in electroreceptors.

Now, let us recall that in nature there are, in addition to electrical stimuli, magnetic stimuli that also affect the organism. For this reason, when the existence of electroreceptors was proven experimentally, the logical question arose: Could animals use them to perceive natural magnetic fields also? According to the data in the literature, the answer to this question was first obtained at the Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences.

It was found that Selachii fish do indeed perceive both changes in magnetic fields and steady magnetic fields. Only one additional prerequisite is required for the latter: the animal and its aquatic environment must move in relation to one another. Either the fish should move in stationary water, or else water must flow around a motionless fish. Then, according to the law of electromagnetic induction, electric current is generated in the animal's body, which excites the electroreceptors. It was also experimentally established that rays are capable of perceiving earth's magnetic field.

This proved, in principle, that vertebrate animals with electroreceptor systems can perceive this stimulus, which is continuously active in nature. And this makes it possible to search for "magnetic sensors" in other animals and man.

In conclusion, let us pose the question: What clinical facts cause physiologists to suspect that electroreceptor systems exist in man? It has been long known that "animal" electricity exists. In the last few years it was discovered that sick and elderly people sense not only atmospheric pressure or air humidity, but various electromagnetic perturbances in the environment. Our body often responds to such weather changes long before they are recorded by the most sensitive of the existing meteorological instruments.

Is it mandatory to expound the hypothesis that man has some sort of specialized receptor structures capable of perceiving electrical and magnetic stimuli to explain these and other facts? It is just as premature to answer this question in the affirmative as to reject the hypothesis. Cardiac contractions and propulsion of blood in vessels cause, as we know, appearance of autogenic, internal electrical potentials. They must interact somehow with the oscillations of atmospheric electricity. Should they be evaluated and, if so, how, and where in the nervous system are such interactions?

Analysis of these phenomena and answers to the questions posed constitute the most important task for electrophysiologists presently concerned with the sense organs and receptor systems of animals and man.

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NEUROMORPHOLOGICAL AND IMMUNOFLUORESCENT INVESTIGATION OF EXPERIMENTAL
INFECTION INDUCED BY AN ATTENUATED STRAIN OF TICK-BORNE ENCEPHALITIS VIRUS

Moscow ARKHIV PATOLOGII in Russian No 4, 1978 pp 25-30

[Article by D. P. Dremov (Tomsk), Laboratory of Arboviruses (headed by Prof Yu. V. Fedorov), Scientific Research Institute of Vaccines and Sera, USSR Ministry of Health, submitted 14 Jun 77]

[Text] Infection induced in Syrian hamsters by hypodermic injection of an attenuated strain of tick-borne encephalitis virus is asymptomatic in all animals; however, within up to 4 weeks, some animals develop mild changes in neurons and hypertrophy of astrocytes. Viral antigen was demonstrated, by the Coons method, in neurons and spleen cells. Intensive treatment of the hamsters with cyclophosphane 106 days after viral infection is not associated with development of morphological changes in the brain that could be related to activation of the virus. No viral antigen was demonstrated in brain imprints either. However, in both immunosuppressant-treated animals and untreated ones, viral antigen was found in mononuclear cellular elements of the spleen.

ARKH. PAT. [Archives of Pathology], No 4, 1978, p 25; 1 table; 3 figures; bibliography lists 9 items.

Key words: experimental tick-borne encephalitis, neuromorphology, persistence of viral antigen.

Live vaccines have been found to be the most effective means of active prevention of severe diseases of man (smallpox, poliomyelitis, measles, yellow fever). One of the main requirements of attenuated strains of neurotropic viruses that are promising for the production of live vaccines is their specific safety. The latter is determined by the following: 1) maximum decrease in level of residual neurovirulence; 2) the incapacity of the virus to induce a progressive lesion to the central nervous system at the long postvaccination stage.

Prolonged survival of the virus of tick-borne encephalitis (TE) in the brain, with chronically progressive course of the disease, has been established in

humans (M. P. Chumakov et al.), as well as experiments on Rhesus monkeys (V. I. Il'yenko et al., 1971, 1974). Subacute sclerosing encephalitis has been described in Syrian hamsters 3 or more months after infection with Langkat virus (Zlotnik et al.; Zlotnik and Grant).

In view of the foregoing, the objectives of this study included the following: 1) to investigate the dynamics of histopathological changes in the brain of Syrian hamsters after infection with an attenuated strain of TE virus; 2) to determine the duration of persistence of viral antigen in the brain and spleen of these animals; 3) to compare the results obtained, bearing in mind the possibility of chronic course of a pathological cerebral process.

We used 60 Syrian hamsters (*Cricetulus auratus*) weighing 40-45 g. Attenuated strain B-67 pf TE virus (V. S. Yerofeyev) was injected hypodermically in a dosage of 10^4 mouse intracerebral LD₅₀ in a volume of 0.3 ml inoculum. Groups of 6 hamsters were sacrificed by decapitation 7, 14 and 28 days after infection, and 8 were sacrificed 21 days after infection. The rest of the animals, including 10 that were not infected (control) were under observation for 106 days. After this, 24 previously infected hamsters were divided into 2 groups: 10 animals were given intraperitoneal injections of 50 mg/kg cyclophosphane in 0.25 ml volume per injection (1st group) 4 times every other day; the immunosuppressant was not given to 14 hamsters (2d group). Control animals (3d group) were given cyclophosphane in the same manner as the 1st group. The hamsters were sacrificed 7 days after the 4th injection, i.e., 121 days after infection.

After primary fixing in 70° ethanol, the brain was imbedded in paraffin; sections were stained according to Nissl (toluidine blue). Sections, prepared on a freeze microtome from pieces fixed in 10% formalin, were impregnated with gold and mercuric chloride by the method of Cajal for demonstration of astrocytes.

An immunofluorescence study was conducted. We prepared impressions of the brain (frontal section at the level of the tuber cinereum) and spleen. After drying, they were fixed for 15 min in cold, chemically pure acetone and stained by the direct Coons method. For this purpose, we mixed equine antiencephalitis γ -globulin labeled with fluorescein isothiocyanate with bovine albumin, labeled with rhodamine, in a ratio of 1:1, to working dilutions. The mixture was applied to the impressions and incubated for 30 min in a humid chamber at 37°C. To test the specificity of fluorescence the following were stained with a mixture of the above conjugates: 1) impressions of analogous organs from non-infected hamsters; 2) impressions of organs of sick hamsters infected with VEE virus; 3) impressions of organs of experimental animals were stained with fluorescent serum from rabbits immunized with the above-mentioned virus. Unbound conjugate was totally removed from the preparations, they were dried and examined under

an Lyumam II fluorescence microscope in a violet-blue exciting spectrum with 90 1.25 objective (MI), and they were photographed on RF-3 film. The intensity of specific fluorescence was graded on a 4-point scale (from + to ++++).

No diseases among infected hamsters were observed prior to administration of cyclophosphane. After the 2d and 3d injections of immunosuppressant, some animals developed conjunctivitis; they became inactive, their coats were moist and ruffled; one hamster in the control group died (not examined). One week after treatment, the hamsters appeared healthy. Post mortem revealed abscesses in the brain and liver in one animal of the 1st group (not examined).

As can be seen in the Table, histopathological changes in the brain were found only in 5 hamsters, which were sacrificed 7, 21 and 28 days after infection. The changes consisted of swelling of neurons with diffusion of chromatophil substance, but usually without severe lesions to the nuclei; they were the most marked in the pyramidal cell layer of Ammon's horn (Figure 1, *a* and *б*). In such areas there were mild inflammatory reactions; occasionally, we saw dilatation and hyperemia of small vessels, swelling and proliferation of adventitial cells. Sites with predominantly hypertrophic reaction of astrocytes (Figure 1, *в* and *з*) were observed in the internal layers of the parietal cortex of only 2 animals, after 21 days. In 21 hamsters, neither lesions to neurons nor inflammatory or astrocyte reaction were demonstrable. Viral antigen was demonstrated in the neuronal cytoplasm of 7 animals 7, 14 and 21 days after infection (see Figure 1б). Specific fluorescence was demonstrated in the spleen, in the cytoplasm of mononuclear cells of 6 hamsters, 7, 14, 21 and 28 days after infection (Figure 2, *a* and *б*). The extensiveness of fluorescence was not significant: 3-5 cells, but not in each field of vision; occasionally, intensity thereof reached +++ in both neurons and spleen cells.

In the 1st and 2d groups of hamsters, we failed to detect histological changes in the brain that could be related to experimental infection. Antigen was found only in the spleen, in a few cells of the macrophage type and in large mononuclear elements in 4 out of 23 animals. The nature of specific fluorescence varies. In some cells, the fluorescent material was granular, and the granules were occasionally scattered more or less uniformly in the cytoplasm and occasionally formed dense accumulations (Figure 2в). In other cells, it was pulverized and uniformly filled the entire cytoplasm, sometimes with more intensive fluorescence in the perinuclear zone (Figure 2з). In some cells, intensity of fluorescence was rated at +++.

It should be noted that, in both experimental groups and the control, some animals presented the typical features of spontaneous protozoan (*N. coniculi* pathogen) encephalitis (pseudocysts, granuloma, mononuclear, vascular, interstitial and membrane infiltration; Figure 1д and Figure 3а). In connection with the granulomas, there was a moderate, proliferative-hypertrophic reaction of astrocytes (Figure 3б).

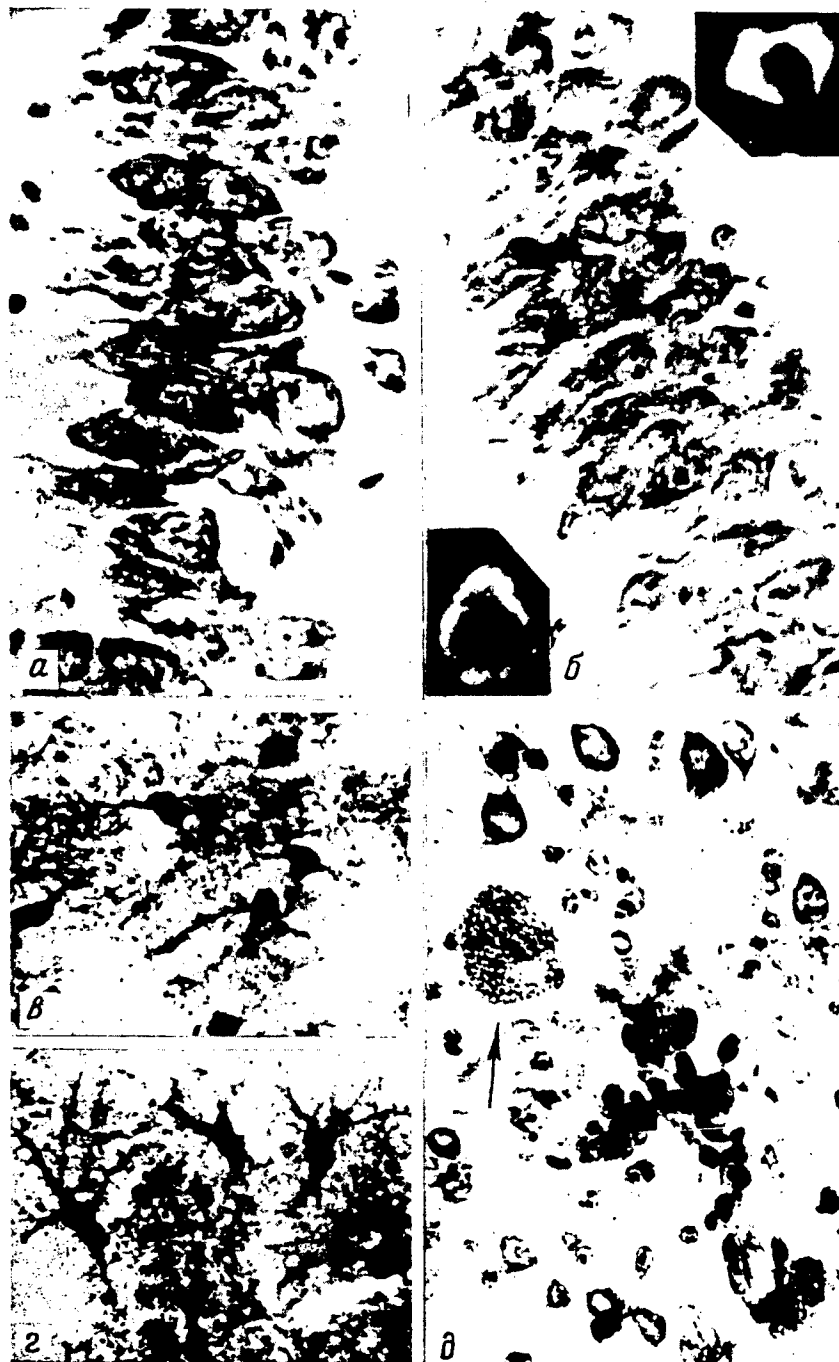


Figure 1. Histopathological changes in the brain of infected hamsters.

- a) pyramidal cell layer of intact animal's Ammon's horn; Nissl stain; 500
- б) swelling and chromatolysis of neurons in same sector of Ammon's horn 7 days after infection; Nissl stain; 500x;

Inserts: fluorescence of viral antigen in neurons 7 days (top right) and 14 days (bottom left) after infection. Immunofluorescence method; 700x

- в) astrocytes in intact animal's Ammon's horn
- г) astrocyte hypertrophy in analogous site of hamster 21 days after infection
- д, г) Cajal impregnation, 500x
- д) parasitic pseudocyst (arrow), mononuclear infiltration in brain of infected hamster; Nissl stain; 500x

Neuromorphological and immunofluorescence indices of infection in Syrian hamsters at different times after infection with an attenuated strain of tick-borne encephalitis virus

Postinfection day	Histopathologic changes	Viral antigen in	
		brain	spleen
7	in brain		
14	2/6	4/6	1/6
21	0/6	1/6	1/6
28	2/8	2/8	2/8
	1/6	0/6	2/6
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121	5/26	7/26	6/26
1st group	0/9	0/9	2/9
2d "	0/14	0/14	2/14
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3d "	0/23	0/23	4/23
	0/9	0/9	0/9

Note: Number of animals with positive findings is given in the numerator and number of animals tested, in the denominator

In spite of the absence of signs of the disease in all of the hamsters, some animals presented focal dystrophic changes in neurons and predominantly a hypertrophic reaction of astrocytes for 4 weeks after infection. The mildness of involvement of neurons and limited extensiveness of specific fluorescence in both the brain and spleen are indicative of considerable decrease in virulence of the tested virus for these animals. We should call attention to the fact that viral antigen was more often observed in the brain in the first 2 weeks after infection than in the 3d and 4th (in 5 out of 12 and 2 out of 14 animals, respectively). At the same time, the opposite findings were made in the spleen: specific fluorescence was presented in 2 out of 12 and 4 out of 14 hamsters, respectively, at the above-mentioned times (see Table).

Treatment of hamsters with cyclophosphane 106 days after infection induced marked depression of immunological reactivity, as indicated by activation of secondary infection. However, morphological examination of the brain of both immunosuppressant-treated and untreated animals failed to demonstrate changes that we could relate to the pathological effect of the virus. We also failed to detect a residual proliferative-hypertrophic astrocyte reaction. This shows that the changes detected at the early stages of infection are reversible. At the same time, viral antigen was demonstrated in the spleen of 4 out of 23 hamsters, which is indicative of persistence of the virus in these specimens.

These dynamics of neuromorphological changes and demonstration of viral antigen in the brain and spleen warrant the assumption, with some degree of probability, that as the latent infection progresses there is "ejection" of virus from the brain, and reproduction thereof is concentrated in extraneural tissues, including the spleen.

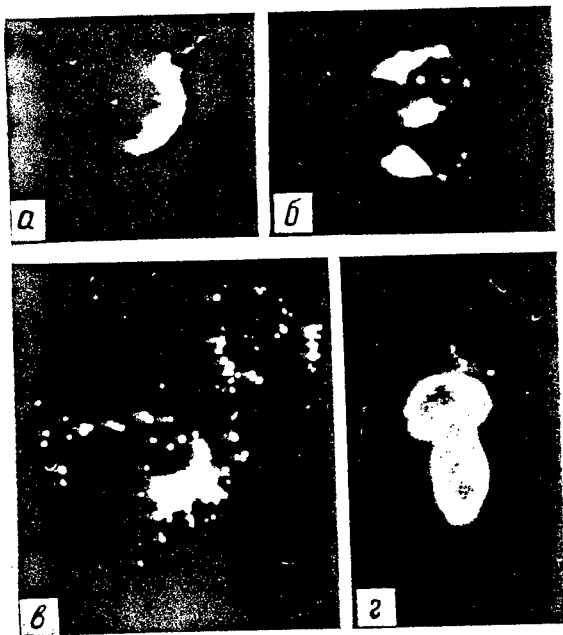


Figure 2.
Fluorescence of viral antigen in spleen cells 7 (a), 28 (b) and 121 (e, z) days after infection

Immunofluorescence method. Magnification: 700× in a, e and z; 900× in b

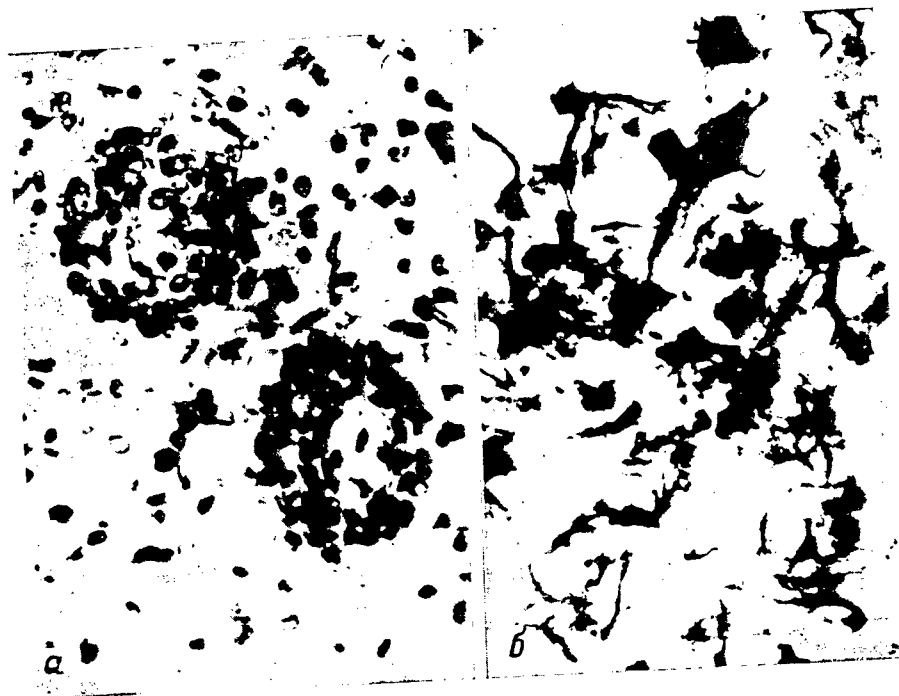


Figure 3. Protozoan encephalitis in infected hamsters.

- a) granuloma in parietal cortex; Nissl stain; 500×
- b) proliferation and hypertrophy of astrocytes related to granuloma; impregnation according to Cajal; 500×

In experiments on white mice, using the immunofluorescence method, it was also established that antigens of attenuated strains of the Tomsk TE virus (E. A. Barsuk et al., 1974, 1975), Yelantsev TE virus and TR-21-5 Langat virus (M. S. Vorob'yeva et al.) persist for a long time. However, in these animals, specific fluorescence was present in the brain, as well as the liver and spleen, but it was demonstrable in the last mentioned organ for a considerably longer time (55, 63 and 77 days, respectively, after infection). In Syrian hamsters, attenuated strains Yelantsev and TR-21-5 could not be isolated at all from the brain and parenchymatous organs, by the method of infectious titration, in the presence of viremia up to the 7th postinfection day (M. S. Vorob'yeva et al.).

Analysis of the cited and our own data indicates that there are significant differences in the pathogenesis of infections induced by various attenuated strains of flaviviruses in different animal species.

Some difficulties arise in evaluating the histopathological changes in the hamster brain, which are due to spontaneous protozoan infection. However, the lack of morphological changes in neurons or marked replacement gliosis of astrocytes, in the presence of the main features of protozoan encephalitis, warrants the conclusion that there is no chronic deleterious process related to persistence of viral antigen.

Conclusion

Thus, for 3 weeks after infecting hamsters with attenuated TE virus, it reproduces in the brain and spleen; however, this does not lead to severe changes in neurons. At the late stage of infection, viral antigen and morphological changes were not demonstrable in the brain, whereas viral antigen was found, as before, in the spleen. It may be assumed that there is gradual development of conditions in the organism of infected hamsters that enable the virus to survive outside the brain. Our data warrant the conclusion that long-term persistence of viral antigen in the spleen of these animals is not a fatal prerequisite for chronic encephalitis.

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ULTRASTRUCTURAL CHANGES IN THE CENTRAL NERVOUS SYSTEM OF MICE SUFFERING FROM
TICK-BORNE ENCEPHALITIS

Moscow ARKHIV PATOLOGII in Russian No 4, 1978 pp 30-37

[Article by B. A. Yerman, L. G. Tulakina, Ye. Yu. Bronitskaya and N. N. Aleksandrova (Sverdlovsk), Laboratory of Pathomorphology (headed by Prof B. A. Yerman), Sverdlovsk Scientific Research Institute of Viral Infections, submitted 11 Oct 77]

[Text] The virus of tick-borne encephalitis is localized in neurons and intercellular spaces. The pathological process in neurons can be divided into three stages, which are related to stages of viral reproduction, according to nature of ultrastructural changes. Dissociation of protein-synthesizing systems of the cell are observed at the first stage. At the second stage, specific viral inclusions are formed in the cell cytoplasm, in the form of accumulations of mature and immature virions, along with destruction of ultrastructure and proliferation of smooth membranes. At the third stage, there is disintegration of neurons with necrobiosis and decomplexation of surrounding glial elements, processes, cells of an inflammatory infiltrate and capillary walls. A specific combination of nonspecific changes in organoids of different cells with viral inclusions renders the ultrastructural appearance of a lesion associated with tick-borne encephalitis rather typical, so that differential pathoanatomical diagnostics is feasible.

ARKH. PAT. [Archives of Pathology], No 4, 1978, p 30; 4 figures; bibliography lists 11 items.

Key words: nervous system, tick-borne encephalitis, electron microscopy.

There has not been sufficient investigation of ultrastructural pathology of the nervous system in the presence of tick-borne encephalitis. In the available literature, there are isolated publications on this topic (I. Sh. Vaysman; T. I. Tikhomirova et al., and others). These are primarily brief reports that do not provide a full enough idea about ultrastructural changes in the central

nervous system (CNS) of animals that are sick. There are also a few reports in the literature concerning cytological changes in tissue culutres infected with the virus of tick-borne encephalitis (A. P. Avtsyn et al.; T. I. Tikhomirova and L. G. Karpovich). The studies are important to determination of cytological bases of the infectious process within the cell. However, they are not sufficient to comprehend the ultrastructural patterns of infection in the macroorganism.

The present investigation was undertaken to define the ultrastructural changes in the animal CNS in the presence of tick-borne encephalitis.

This study was conducted on white mongrel mice, which were infected hypodermically with the virus of tick-borne encephalitis (Sof'in strain) in a dosage of 100 LD₅₀ in 0.2 ml brain suspension. On the 8th day after infection, when signs of the disease appeared in the form of paralysis of the limbs, the mice were sacrificed by decapitation. Intact animals served as a control. Tissue was fixed in glutaraldehyde buffered according to Carlson and Schultz with subsequent osmium fixation according to Shestrand; it was then dehydrated in ascending concentrations of alcohol, imbedded in a mixture of metacrylate and araldite. Sections were cut on an LKB-4800 ultramicrotome, contrasted with uranyl acetate according to Shestrand and lead citrate according to Reynolds; they were examined under a UEMV-100K electron microscope. In addition to electron microscopy, the animals' organs were submitted to histological and virological examination by the conventional techniques. In all, there were 20 mice in the experiment, 8 of which were controls.

Pathohistological studies of the CNS of infected mice revealed the typical changes of tick-borne encephalitis in the brain stem, Ammon's horns, as well as cervical and lumbar segments of the spinal cord. In these areas, there were focal, inflammatory-degenerative changes with massive destruction of neurons, marked round-cell infiltration and circulatory disorders.

The pathological process in neurons can be arbitrarily divided into three stages, according to the nature of ultrastructural changes. The first corresponds to the eclipse phase of infection and the second, to actual viral reproduction and composition of viral particles; the third begins after reproduction and exit of the virus from the cell. One may find neurons at different stages of the pathological process in one focal lesion, ranging from early, negligible changes to death of cells with total destruction of their ultrastructure.

The first stage of the pathological process is characterized by breakdown of the protein-synthesizing system of the cell. There is a sharp reduction in number and disorderly arrangement of ribosomes bound with membranes, as well as ribosomes and polysomes in the cytoplasmic matrix. In some places, the membranes of the endoplasmic reticulum are indistinct and interrupted.

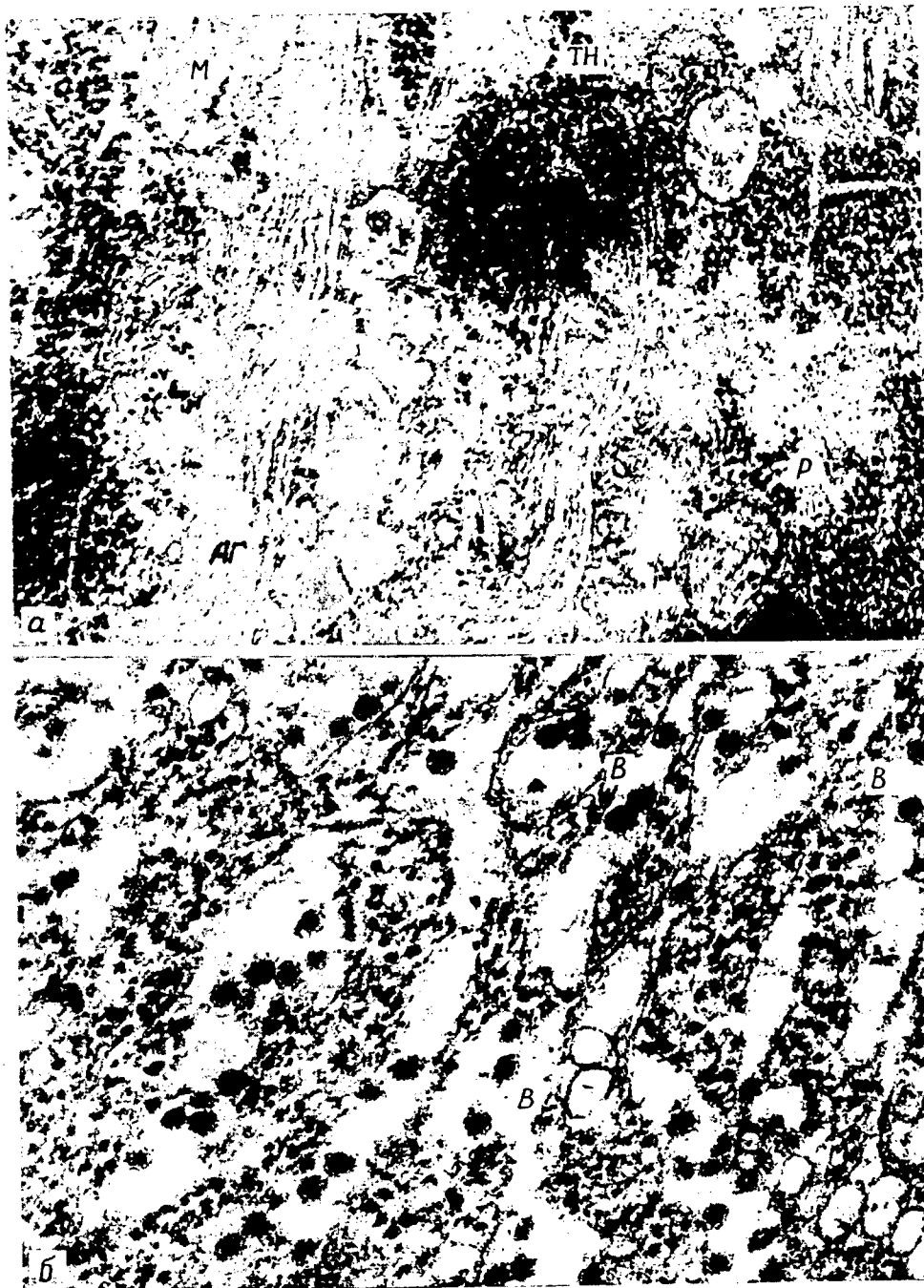


Figure 1. Cytoplasm of neurons from cervical segment of spinal cord
 a) control mouse; M) mitochondria; TH) Golgi apparatus; P) ribosomes;
 TH) Nissl bodies; 32,000×
 b) infected mouse; in the cisterns of the endoplasmic reticulum of the neuron
 there are many mature virions of tick-borne encephalitis, with accumula-
 tions of electron-dense particles in the cytoplasmic matrix; severe
 changes in ultrastructures of the cell; B) virus; 72,000×

Numerous blebs appear in the cytoplasm. The laminar complex (Golgi's system) underwent moderate changes in the form of dilatation of tubules. There we observed swelling of mitochondria with clearing of the matrix, fragmentation and disintegration of cristae.

The second stage of the pathological process is characterized by reproduction of tick-borne encephalitis virus in neurons and progression of ultrastructural changes in them (Figures 1 and 2). Accumulations of TE [tick-borne encephalitis] virus were observed in the perikaryon of neurons, in the form of mature and immature viral particles (see Figure 16). Mature viral particles in a discrete form were localized in the dilated disternae, tubules and vesicles of the endoplasmic net of the cells. They were spherical, 34 to 37 nm in diameter, presenting a distinct protein sheath around an electron-dense nucleoid. Elements similar to viral particles were also encountered in the cytoplasmic matrix of the cells. These particles resembled viral nucleoid in size, electron density and shape, but, unlike mature virions, had no outer coat. In some areas we were able to observe passage of virus-like particles from the cytoplasmic matrix into the cisternae of the endoplasmic reticulum, with formation of mature virions. It may be assumed that formation of the nucleoid takes place in the cytoplasmic matrix, while the external protein sheath is formed at the expense of membranes of the endoplasmic reticulum at the time the nucleoid exits into the cisternae of the endoplasmic net, along with the adjacent part of the membrane. TE virus was also encountered in cellular processes (see Figure 28).

At this stage of the pathological process, the cell undergoes severe ultrastructural changes. Ergastoplasm and polysomes were not visualized. The dilated cytoplasmic matrix consists of a homogeneous substance, with moderate electron density, that contains an enormous amount of electron-dense particles of the most diverse sizes and shapes. The tubules and cisternae of the endoplasmic reticulum, which contain viral particles, are dilated. The membranes circumscribing the tubules are smooth and cannot be tracked clearly in all places, and some places are injured. There is intensive proliferation of smooth membranes. They extend, in the form of loops and bundles, over a considerable distance in the cytoplasmic matrix, and they form numerous fine vesicles, in which virions are encountered. Not infrequently, large cavities are formed in the perikaryon, and they contain many vesicles of the most diverse shapes and sizes.

Golgi's complex is hypertrophied, with severely dilated cisternae and vacuolar spaces in some cells, in others there are compressed, constricted cisternae. As a rule, the mitochondria are hypertrophied, deformed, discolored and contain fragments of cristae; the external membrane is in a state of disintegration in some areas. Not infrequently, the mitochondria form large, clear vacuoles with residues of cristae. Autophagosomes are encountered in degenerative cells. No lysosomes are visible. In the cell nuclei, there is uneven distribution and scattering of chromatin, with signs of disintegration and dissolution of the nucleolus. The nuclear membrane is disintegrated in some areas, as a result of which the contents of the nucleus escape into the cytoplasm.



Figure 2. Changes in neurons after TE virus infection

- a) proliferation of smooth membranes in a neuron of an infected mouse; M) mitochondria; M) membranes; B) virus; 43,000×
- b) TE virus (B) situated in the region of a disintegrated neuron, in the form of beads and discretely; 62,000×
- e) TE virus (B) in a process; M) mitochondria; 40,000×

The third stage of the pathological process is characterized by destruction of neurons with TE virus present in dead cells and intercellular spaces. This is associated with disintegration of nuclear and cytoplasmic membranes, with exit of destructively altered organelles and virus into the intercellular spaces. TE virus is discretely localized in the disintegrated cells and intercellular spaces, as well as in the form of necklaces or strands of beads (see Figure 26). Some of the neurons perish, and become pyknomorphic, with consolidation and osmiophilia of ultrastructures.

Severe changes, with edema, disintegration and straightening of ultrastructures were also observed in glial elements, nonmyelinated and myelinated fibers, in inflammatory infiltrate cells (mononuclears, leukocytes) and vascular walls, which ultimately led to total decomplexation of tissues in the lesion site. The cytoplasm of glial cells was usually severely vacuolized, edematous and discolored; the cytoplasmic matrix was consolidated, contained many osmiophilic granules; the mitochondria were consolidated with remnants of cristae; the nuclei were osmiophilic, with signs of margination of chromatin. In the neuronal processes there was edema, stratification, fragmentation and dissolution of myelin.

At the lesion sites, the capillaries were so changed that it was not always possible to distinguish any ultrastructures in endothelial cells. The cytoplasm of endothelial cells was consolidated, more osmiophilic, in the form of fine granules or, on the contrary, edematous, discolored, friable and with virtually no intact ultrastructures (Figure 3). In some areas we encountered isolated TE virions. The basement layer of the capillaries was edematous, friable and dissolved in some areas. There was significant edema around the capillaries, both within the processes of glial cells and in the intercellular spaces, with formation of large cavities (Figure 4). Significant accumulations of TE virus were often encountered in the perivascular spaces.

There was alteration of lymphocytes, macrophages and polymorphonuclear leukocytes surrounding involved neurons and capillaries. There was poor demonstration of organelles in such cells. The consolidated cytoplasmic matrix of the cells consists of fine granules, moderately electron-dense material with vacuoles and accumulations of osmiophilic granules, the nature of which is not clear.

The pathomorphological changes in the neurons are attributable to reproduction of TE virus in them. The changes observed in the cells should be qualified as protein dystrophy leading to colliquation necrosis, which is consistent with the existing conceptions of viral pathology (V. V. Serov and V. S. Paukov). In addition, reactive changes are also observed in involved cells, in the form of temporary proliferation of smooth membranes, related to pathological regenerative and dysplastic processes in dying cells (A. P. Avtsyn; D. S. Sarkisov and B. V. Vtyurin; A. I. Strukov).

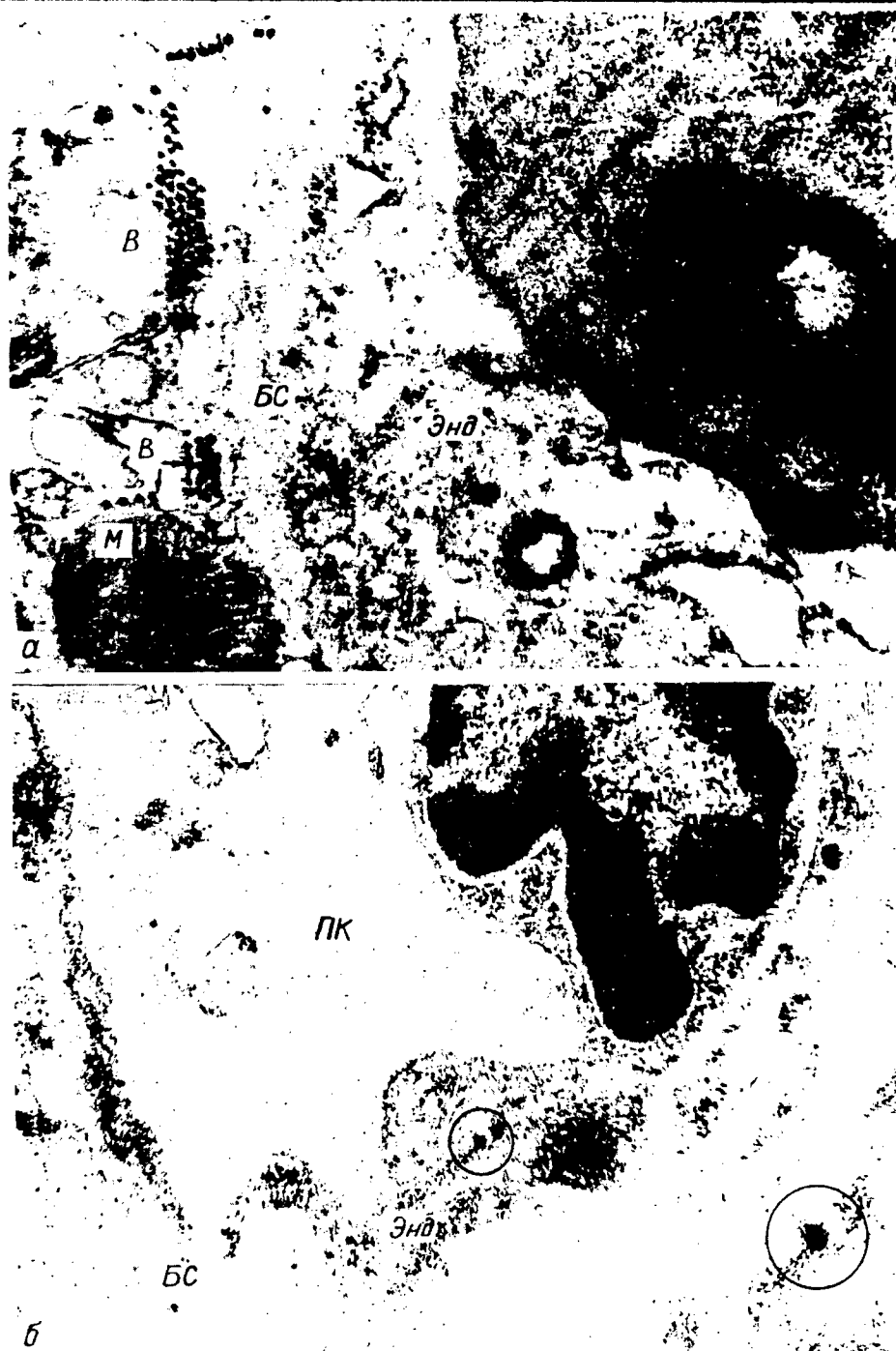


Figure 3. Ultrastructural changes in capillary walls after infection with TE virus. Friable and dissolved endothelium and basement layer; TE virus is situated perivascularly and in endothelium. The virions are very close to the external mitochondrial membrane

B) virus	Энд) endothelium	ПК) capillary lumen	б) 41,000×
M) mitochondria	BC) basement layer	а) 38,000×	insert) 60,000×

Marked destructive changes in the CNS, in the presence of TE, develop not only as a result of viral reproduction in neurons, which is the decisive factor in the infectious process, but as a result of severe changes in the hemato-encephalic barrier, which leads to severe impairment of its permeability, intensive edema, hypoxia, acidosis and activation of hydrolytic enzymes. This leads to secondary severe changes in all morphological structures of the nervous system. I. A. Robinson pointed to the exceptional importance of lesions to astrocytic glia and vasomesenchymal elements in the presence of tick-borne encephalitis. T. I. Tikhomirova and L. G. Karpovich observed TE virus in glial cells.

Thus, in the presence of TE, formation of focal lesions is related to two pathogenetic factors: reproduction of the virus in neurons and destructive changes in the hemato-encephalic barrier. The combination of these two factors is what leads to such severe and distinctive changes in the nervous system. The same factors are the basis for penetration of the virus into the nervous system and spreading in it. Impairment of permeability of the blood-brain barrier enables the virus to penetrate from blood into the CNS, while the edema makes it possible for the pathogen to spread from one neuron to another over the formed intercellular spaces.

The changes in cellular organoids are nonspecific, and they are encountered in the presence of diverse effects on the nervous system (A. A. Manina). However, a certain combination of nonspecific ultrastructural changes in the organoids of different cells with specific viral inclusions causes the ultrastructural findings to be quite typical for the purpose of differential patho-anatomical diagnostics.

Conclusion

TE virus is localized in neurons in the form of mature virions, in the tubules and cisternae of the endoplasmic reticulum and immature viral particles in the cytoplasmic matrix. The pathological process in nerve cells can be divided into three stages, which are related to the stages of reproduction of the virus, on the basis of the nature of ultrastructural changes. At the first stage, we observe disintegration of protein-synthesizing systems of the cell. At the second stage, specific viral inclusions of mature and immature virions are formed in the cellular cytoplasm. In addition, there is destruction of ultrastructures of the cell, with significant proliferation of smooth membranes. At the third stage, there is disintegration of neurons, with necrobiosis and decomplexation of surrounding glial elements, processes, inflammatory infiltrate cells and capillary walls. The virus is present in disintegrated neurons, intercellular and perivascular spaces. The severe, colliquative changes in the focal lesion are based on two pathogenetic mechanisms: viral reproduction in neurons and alterative changes in the blood-brain barrier. The changes in the organoids are nonspecific. However, a specific combination of nonspecific changes with viral inclusions renders the ultrastructural findings typical enough for differential pathoanatomical diagnostics.

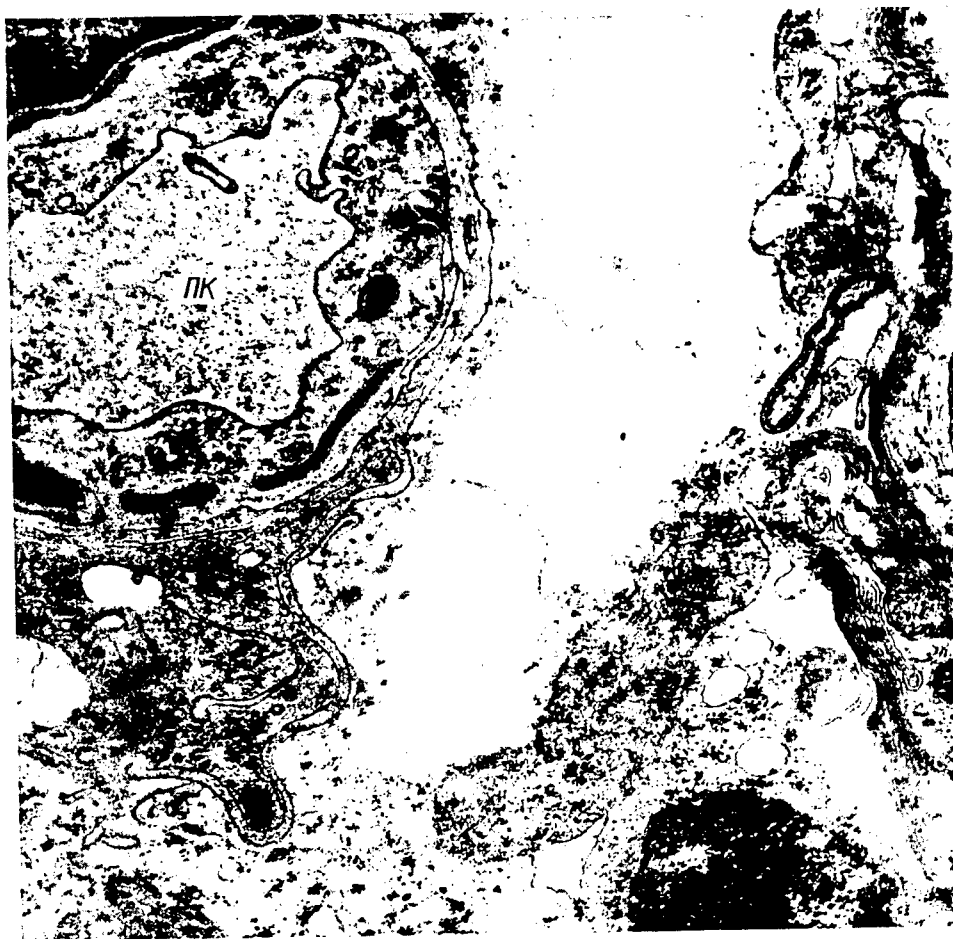


Figure 4. Perivascular edema with formation of cavity; 15,000×
 ПК—capillary lumen

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RESULTS OF TREATMENT OF RECURRING TUMORS WITH LASER RADIATION

Kiev KLINICHESKAYA KHIRURGIYA in Russian No 5, 1978 pp 42-44

[Article by Doctor of Medical Sciences I. R. Lazarev and Candidate of Medical Sciences N. M. Bondar']

[Text] More than 400 patients with cancer of the skin and oral cavity mucosa were treated with laser radiation: 63 of them were admitted to the clinic with recurrences following other types of treatment. A follow-up study was carried out in 57 patients (53 with recurrence of skin cancer and 4 with oral cavity cancer). Following laser treatment three of them showed recurrences. Treatment techniques are discussed and it is concluded that a 2-8 year follow-up revealed favorable results in 94.7% of the patients.

There are many methods of treating skin cancer, but none of them guarantees against recurrence. Medications used earlier (omaine and colchamine ointments, Gordeyev and Korchaul's fluid and solid carbon dioxide) have proven ineffective, especially during the spread of tumorous affections. Hopes have also not been justified by 5% fluorouracyl ointment, since there were 20-30% recurrences of cancer even in its superficial form, and up to 40-50% in infiltrating forms.

Surgical, electrosurgical, radiative, cryodestructive and combined methods have been used to treat skin cancer.

After surgical and electrosurgical dissection of skin cancer the frequency of recurrence is 11-20% (A. P. Shanin). After short-focus radiotherapy, which has recently found wide application, recurrences are detected in 7-10% of the patients in five-year examinations and in 10-36% in longer periods (5-10 years) (O. M. Kim, Hansen, Jensen, Swierzowa, and others).

The same methods are used to treat cancer of the oral cavity mucosa as in skin cancer. None of them guarantees against recurrences.

Eneroth et al studied the results of treatment of 123 patients with squamous cell carcinoma of the palate and noted metastases in 54%.

Thanks to the achievements of quantum electronics and the creation of lasers it has become possible to use them in various branches of medicine, including oncology (S. D. Pletnev et al, R. Ye. Kavetskiy et al, I. R. Lazarev et al, N. F. Gamaleya, Goldman, and others).

Two types of lasers are used to treat skin cancer: pulsed lasers, in which the active substance is neodymium (EOS-1001) and which have a power of up to 1000 joules, and continuous gas lasers (carbon dioxide, with a power of 40-60 watts). Pulsed lasers have been used only to treat skin cancer. If a tumor had a diameter of up to 1.5 cm, it was covered with a light beam within the limits of the healthy tissue and destroyed by a pulse with an energy density of 300-360 joules/cm² for 2 milliseconds. For larger tumors several pulses with the same energy density were produced in order to destroy the entire tumor within the limits of the healthy tissue. The manipulation was performed without anesthesia.

Pulsed lasers have some shortcomings: it is impossible to work with them on tumors located in the oral cavity, on the eyelids (lesion of the eyes is dangerous) or in other places difficult of access.

In the last 3 years we have used mainly continuous gas lasers with carbon dioxide as the active material. The advantage of this type of laser is that, when the beam is focused at the focal point with a power of 40-60 watts, tissues are readily dissected, and they are coagulated when the beam diameter is enlarged.

If a tumor has a diameter of up to 2 cm, it is advisable to coagulate it in situ. Tumors with larger dimensions are dissected and sutures are applied later. With the gas laser the manipulation can be carried out on hollow organs and also on the eyelids. When tissue is cut with a gas laser the capillaries and fine vessels are coagulated. Therefore no serious hemorrhages are observed. Large vessels must be ligated.

Malignant tumors are treated with both pulsed and gas lasers in a single session.

We have treated with laser radiation over 400 patients with cancer of the skin and of the mucous membrane of the oral cavity, 63 of whom had cancers recurring after the administration of other types of therapy. Fifty-seven of the 63 were under observation. Of them, 53 had recurrent skin cancer and 4 recurrent cancer of the mucous membrane of the oral cavity. In histological structure 14 patients had squamous cell carcinoma and 39 basal cell carcinoma, and in 4 patients the tumor structure is not indicated. Those patients had previously received surgical, electrosurgical and combined treatment, cryodestruction of the tumor, and X-ray and radio therapy.

A large portion of the patients were persons who had previously received X-ray therapy. However, this does not mean that recurrences appear more often after such therapy than after other methods of treatment. The simple fact is that X-ray therapy has begun to be applied more often in skin cancer at the present time. Evidently more patients with recurrences of cancer who had previously received X-ray therapy were sent to us, although it must be taken into consideration that there are skin tumors insensitive to X-rays. In some patients recurrence of skin cancer appears after two or three courses of short-focus X-ray therapy, and further effect on the tumor by X-rays or radioactive substances was counterindicated by that.

Nine patients came to us with recurrent skin cancer after cryodestruction. This treatment is used to treat considerably fewer patients than X-rays because the apparatus is not available everywhere.

Thirty-four patients had recurrences of cancer of the skin of the head and face, four of the mucous membrane of the oral cavity, nine of the skin of the torso, six of the skin of the upper and four of the lower extremities.

Of 57 patients admitted with recurrences after receiving therapy by various methods, the tumor reappeared after treatment with laser radiation in three. Of them, one patient had basal cell and two had squamous cell carcinoma. In three patients the recurrence occurred up to 6 months after the effect of laser radiation.

In those treated with laser radiation, healing usually sets in after 3-4 weeks, but in the region of scarred changed tissue which appears after X-ray therapy the period of regeneration increases by 4-5 days. The effect of laser radiation leaves a relatively more tender cicatrix than other methods of therapy.

On the basis of what has been said it can be concluded that laser rays (especially continuous rays) are a fairly effective means of therapy of both recurrent skin cancer and of skin cancer in general. They can be successfully applied in clinical oncology.

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PUBLIC HEALTH

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WORKING CONDITIONS AND MORBIDITY INVOLVING TEMPORARY INCAPACITATION AT ENTERPRISES OF ELECTRICAL ENGINEERING INDUSTRY

Baku AZERBAYDZHANSKIY MEDITSINSKIY ZHURNAL in Russian No 2, 1978 pp 76-79

[Article by Z. A. Nadzhafov, Azerbaydzhan SSR Committee of the Electric Power Plant and Electrical Engineering Industry Workers Trade Union]

[Text] The CPSU Central Committee and USSR Council of Ministers decree "On Measures to Improve Public Health" adopted in September 1977 devotes special attention to control of industrial injuries, overall morbidity, and their prevention.

In 8 years (1967-1974) I studied the frequency of injuries and overall morbidity as well as steps taken to prevent them at three of the republic's leading electrical engineering industry enterprises. I revealed that only 40-50 percent of the labor of workers in the main operations and 35-45 percent of the labor of auxiliary workers has been mechanized, the proportion of manual labor being 60-65 percent. Here lies the principal reason of injury at the workplaces.

An analysis has shown that the monthly (average) frequencies of injury are: Seven at BEMZ [Baku Electromechanical Plant], four at the Elektrotsentrolit Plant, and one at the Azerelektrosvet Plant. As we can see, a significant number of injuries occur at the BEMZ and the Elektrotsentrolit Plant. As a result the average monthly number of days of incapacitation is 198 for BEMZ and 115 for the Elektrotsentrolit Plant. The lowest injury index is noted for the Azerelektrosvet Plant.

Moreover an analysis of the obtained data showed that about 40 percent of the minor injuries led to loss of working ability; victims of 12 percent of these injuries were transferred to lighter work, 21 percent received certificates of temporary incapacitation, and 1.5-3 percent were released from work until the end of their shifts. All minor injuries requiring medical care mean a loss of 1.5-2 hours of working time.

Economic computations show that the financial loss resulting from industrial injury involving temporary incapacitation of the victims for one-third of the workday is from 15 to 30 rubles, while when incapacitation lasts four workdays and more the loss is up to 200 rubles. These losses are from 3 to 8 rubles

and more per day of temporary incapacitation. The reasons for injury are: Hazardous storage of raw materials, semifinished products, and finished products, absence or poor condition of fencing (more than 60 percent of the injuries arise namely for these reasons); 40 percent of the cases of injury occur due to failure to instruct the workers, poor organization of training provided to workers in safe work methods and procedures, poor acquaintance with industrial safety rules, and a number of other reasons. The machinery, equipment, and mechanisms used in the shops generate wideband noise at levels significantly exceeding the permissible spectrum values. Intense noise at the Elektrosentrolit Plant attains 102-117 db in the stamping shop. The level of production noise in the trimming shop of the Elektrosentrolit Plant attains 95-100 db. As a result the central nervous system is disturbed, and the attention of the workers is dulled, which not only promotes impaired hearing but also leads to injury and disease.

It has been established that the frequency and severity of injury per 1,000 workers is very high at BEMZ and the Elektrosentrolit Plant. Thus in the period under examination the injury frequency coefficient of BEMZ varied from 15.9 to 62.6 and the coefficient of injury severity varied from 21.4 to 26.7, while the figures were 24.6 to 69.2 and 25.0 to 37.3 for the Elektrosentrolit Plant and 3.5 to 10.9 and 14.5 to 36.0 for the Azerelektrosvet Plant. This can be explained by the presence of casting production and excessive intensity of labor at conveyors, owing to which the workers become overtired and the incidence of injuries and diseases grows. The greatest number of injuries per 1,000 workers was recorded in the stamping, casting, trimming, and mechanical assembly shops--that is, those in which manual labor dominates.

The direct factors of injury during work included falling of a worker, flying fragments or dropping tools, hands or other parts of the body caught in machinery, small dust particles entering the eyes, and so on. The nature of industrial injuries is associated with breakdown of the integrity of soft tissues (cuts, lacerations, and compression of soft tissues, contusions, minor cuts, and so on).

It should be noted that the injury indices of BEMZ and the Elektrosentrolit Plant exceed the average level for the nation's electrical engineering industry enterprises by 40 percent. This situation can be explained first by the large proportion of manual operations in the production process among duty fitters, electricians, equipment repairmen, machine tool adjusters, assemblers, winders, and so on; second by the low exactingness of section foremen toward workers, particularly by inadequate compliance with labor protection and industrial safety rules. Poor surveillance over workers is the cause of half of the cases of injury; about 14 percent of the injuries stem from failure to comply with the industrial safety norms and rules at the workplace.

It was revealed from annual reports of temporary incapacitation filed by the enterprises that failure to appear for work due to injury results in a 15 percent loss of the nominal working time.

Next I studied overall morbidity of workers at the enterprises analyzed; I revealed that the index of overall morbidity and the days of incapacitation per 100 workers were rather high, and that their level varied from year to year. Thus in the period under examination the number of cases of disease per 100 workers varied within 181-266 and the number of days of incapacitation was from 1,222 to 2,144 for BEMZ, the figures for the Elektrotsentrolit Plant were from 234 to 279 cases and from 1,612 to 2,226 days of incapacitation respectively, and the figures for the Azerelektrosvet Plant were from 116 to 226 and from 769 to 1,564.

Economic computations showed that on an annual average, there are two to three cases of morbidity coupled with incapacitation lasting up to 20 days for each person. During this time the worker suffers an average cut in wages from 60 to 160 rubles.

An inspection showed that extensive morbidity indices pertaining to acute widespread infections (acute bronchitis, broncholitis, and so on) were, with respect to the total number of cases in just 1975, 41 percent for BEMZ, 43 percent for the Elektrotsentrolit Plant, and 40.8 percent for the Azerelektrosvet Plant. High indices can be noted for diseases such as acute pharyngitis, tonsillitis, and so on. At the same time the low indices of these enterprises in relation to gastrointestinal diseases, tuberculosis of respiratory organs, and so on are interesting.

Research has shown that the concentration of carbon monoxide in the casting, trimming, and other shops of the Elektrotsentrolit Plant is from 3.1 to 3.7 times above normal; the air temperature of the workplaces of cupola workers, furnace operators, teemers, and other workers in the smelting shop attains 50-75°. The workers experience disturbance in heat regulation as a result, leading to changes in protein metabolism in the body; overtiring and a decline in working ability set in.

Another unfavorable factor influencing the health of workers is the high intensity of infrared rays coupled with the high brightness of the surface of melted metal, jets of burning gases, and so on. Observations showed that the heat radiation experienced by workers in the summer attains 1.0-3.1 calories per square centimeter per minute, and that the air temperature at various points within the shop varies on the average from 23 to 41°C at a relative humidity of 50-83 percent; air circulation rate is 0.5-0.8 meters per second. These indices differ dramatically from those of air outside the shop, and circulation between the shop and the outside promotes diseases caused by drafts.

The ventilation systems of the enterprises are unable to suck toxic compounds out, as a result of which the air environment at workplaces becomes contaminated; thus the dust concentration in sand-preparing sections of the Elektrotsentrolit Plant exceeds permissible norms by 65-103 times. At BEMZ the styrol concentration at the workplaces of solderers and painters and in the plastic section exceeds the permissible concentration by 2.2-4.5 times,

the phenol concentration exceeds permissible values by 1.9 times, and the formaldehyde concentration exceeds permissible values by 2.0-4.1 times; this could lead to acute bronchitis and some other diseases.

The average time of illness varies from 9.1 to 19.1 days for different diseases, and it exceeds the average national level for the machine building sector; it exceeds that of machine building enterprises of the Azerbaydzhan SSR by more than 50 percent.

An analysis of information from the examined enterprises showed that because of nonrhythmical work in the shops and sections, the administration requests overtime work, which can promote arisal of hypertension and cardiac and other diseases. Overtime conflicts with the existing workday regulations aimed at insuring high effectiveness of labor and compliance with its socially normal intensity.

It should be noted in conclusion that absence of fencing at workplaces, untimely instruction of workers, a low level of mechanization of manual labor, and unsensible implementation of work procedures and methods are the causes of injuries. These causes promote early retirement of workers associated with occupational hazards. The working conditions in different occupations during certain seasons of the year are typified by unfavorable production environment--an unstable microclimate at the workplace, thermal radiation, and thermal gradients.

Intense noise also has an influence on the worker's body on the background of the integrated action of these factors combined with manual labor. In the casting and stamping shops the parameters of noise generated by working equipment and mechanisms exceed permissible public health values, which leads to premature tiring of the workers.

The preventive measures we suggest should reduce the level of both injuries and overall morbidity, decrease losses in work time, and heighten labor productivity. These proposals boil down to the following:

- a) Safe places must be designated for storage of articles, semifinished products, spare parts, and equipment so that they would not clutter up work spaces, passageways, and so on. Equipment and tools should be maintained in working condition;
- b) the moving and rotating parts of machines and machine units and the places of possible contact of workers with hot surfaces, caustic liquids, and other substances must be fenced off by housings, screens, gratings, and panels. Shop and section passageways must be furnished with natural and artificial lighting, and difficult manual operations in hot shops should be mechanized and automated;
- c) excess heat, dust, smoke, vapors, and gases must be removed from work spaces by ventilation and aeration;

d) an artificial climate must be created with air conditioning devices to maintain constant purity of air at the workplace (in the space). These controllable devices supply purified and, depending on the concrete weather conditions, humidified or dried, heated or cooled air to the room and simultaneously remove spent air;

e) noise from rotating or moving units and machine units should be eliminated or reduced by making sure all parts fit together well and adjusting their work; moreover noisy equipment should be placed outside of production areas in which workers are located, or the places in which such equipment is located should be outfitted with soundproof booths or rooms for maintenance personnel;

f) workers applying for work associated with possible influences of noise should undergo medical examinations, and they should be periodically reexamined once a year while on the job.

Elimination of these factors, which have an unfavorable influence on the worker's body, will promote reduction of morbidity and injury at the republic's enterprises.

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PRESSING PROBLEMS OF EPIDEMIOLOGY AND PREVENTION OF ANTHRAX

Kishinev ZDRAVOOKHRANENIYE in Russian No 2, 1978 pp 31-35

[Article by E. N. Shlyakhov and V. I. Prisakar', Chair of Epidemiology and Immunobiology (headed by Honored Scientist, Prof E. N. Shlyakhov), Kishinev Medical Institute, submitted 23 Jan 78]

[Text] In the past, Bessarabia was one of the regions most severely stricken with anthrax, and the incidence thereof rose from year to year. Thus, in 5 years alone (1934-1938) a total of 5117 people contracted anthrax, and the incidence thereof doubled by the end of this five-year period, as compared to the start. It reached 57.7 cases per 100,000 population, which was higher than the incidence of typhoid fever and typhus together.

During the period of fascist occupation, the epizootic state of Moldavia became extremely critical. The cattle burying grounds organized under Soviet rule in 1940-1941 were done away with or destroyed under the occupation, animals that died were not buried, but thrown away. All this was instrumental in intensive contamination of the region with anthrax spores and formation of persistent endemic soil sites.

The incidence of anthrax among the inhabitants of Moldavian SSR began to drop sharply in 1945, i.e., at the start of postwar restoration of the national economy, implementation of regular [planned] epizootic-control and medical measures.

As far back as 1966, E. N. Shlyakhov developed a system for eradicating zoo-anthroponotic infections, including anthrax, consisting of two stages: first, protective, at which the objective is to reduce to a minimum the number of sick cases among humans, rather than eradication of infection in nature, and second, the final stage, which is equated with biological eradication of the pathogen and stable elimination of parasites from sources of infection.

Following this classification, the first stage of eradication of anthrax has now been reached in the republic. This is indicative of beneficial socioeconomic changes in the area of lowering morbidity of humans.

However, the steps taken to date cannot eradicate the infection completely, since they have no direct effect on the pathogen in the soil, and, as we know, it can persist in soil for 60-70 years, even multiply under adequate conditions.

In view of this property of the pathogen, as well as the presence in Moldavia of scattered endemic soil sites for anthrax, which appeared in the past, and the fact that isolated cases of this infection are still recorded among animals, the threat of disease will be real for a long time, even after the epizootiological situation becomes good.

To reach the final stage of eradication of anthrax, it is particularly important to disinfect the soil sites in order to eradicate completely the pathogen of anthrax as a biological species from the territory of the republic.

For this purpose, it is imperative to find all of the areas that are a permanent anthrax problem, define the location of soil sites in them, keep a strict record thereof, i.e., certification, and map them, study their epizootiological and epidemiological activity in different landforms of the republic, and implement a set of measures to disinfect them.

Various methods have been described in the literature for decontamination of anthrax sites, including pastures, by means of planting sporocidal plants, using antibiotics, actinomycetes, new chemical disinfectants, etc. However, these methods have not yet been adopted on a broad scale. For this reason, it is a pressing matter to submit them to practical trials, as well as to develop new, more accessible and cheaper methods of decontaminating the soil.

Continued decline of anthrax among animals, until there are no cases at all and stable existence of a good situation in the sense of epidemiology, in the presence of soil sites of this infection depend entirely on organization and level of implementation of a rational set of measures directed to all three elements of the epidemic process, with due consideration of the epidemiological distinctions of modern anthrax. Epizootiological and epidemiological analyses indicate that the cases of the disease among people in the last few years (1960-1975) were related to animals in 95% of the cases. For this reason, in order to continue to maintain a good epidemiological situation it is imperative to prevent anthrax among farm animals as the main element in the epidemic (epizootic) process of this infectious disease. For these purposes, inoculation of cattle was and remains one of the main measures. By virtue of the frequent migration of livestock and lengthy cattle drives, they should all be covered with inoculations in all populated centers, regardless of the fact that there is no epidemiological problem there. In addition, inoculations should be given twice a year to cattle, as the chief source of infection (71.6% of the cases), in active areas.

At the same time, of all the cases of anthrax in animals, which we studied over a 15-year period (1961-1975), 72% were recorded among noninoculated livestock; about 70% of them are referable to animals in the individual sector. This is indicative of inadequate coverage of animals, especially the private sector, with preventive inoculations, which is the result of incomplete records thereof.

However, it must be noted that 28% of the sick cases in the same period were referable to inoculated livestock, which is attributable to faulty inoculation technique or use of vaccine of poor quality, which had lost its immunogenic properties (62.8% of the sick cases occurred in the first 6 months after inoculation, when immunity should have been rather intensive).

Thus, in order to increase the efficacy of preventive inoculations, a strict record must be kept of all livestock, particularly in the private sector, with complete coverage with proper inoculation. It is necessary to organize special inoculation centers in each veterinary district for inoculation of livestock in the private sector, and strict penalties should be imposed on livestock owners who hide animals from veterinary agencies or refuse to have them inoculated.

One of the pressing tasks at this stage is also to protect new territories from contamination by the pathogens of this infection. The principal measure in this area is a strict ban on "backyard" slaughtering of livestock, for which purpose slaughtering houses or areas must be constructed in each populated center, which would also raise the standards and improve hygienic conditions of meat processing.

The best method of disposing of carcasses of animals stricken with anthrax or products thereof is to burn them on the spot, for which purpose it is imperative to develop very simple, mobile and easily operated incinerators. The construction of biothermic pits has also retained its significance as a cheap and safe method of decontaminating carcasses, which replaces cattle burying grounds entirely, since the latter often become the site of animal infection, even several decades later.

The outbreak of anthrax among cattle, in 1968, in one of the populated centers, can serve as an example. A survey revealed that animals inoculated with a vaccine that had lost its immunogenic properties due to improper storage were infected in an area where carcasses had been buried in 1930.

Immunization of the public occupies an important place in the system of preventive measures. The sanitary and epidemiological service of the republic, together with the medical network, has been implementing much work for the last 2 decades with respect to inoculation of the endangered population group, and this, along with other measures, aids in lowering morbidity.

However, in spite of the sharp decline of morbidity, there is an annual increase in coverage of the public with inoculations. This is indicated by the following data:

While in 1955 only 2883 people had been vaccinated in the republic, this number doubled in 1957, increased by 3 times in 1959, by 4 times in 1962, 14 times in 1964, 20 times in 1966, 22 times in 1969, 24.5 times in 1972, 28.6 times in 1973, 31.7 times in 1974 and 34.5 times in 1976, which corresponds to 100,000 people.

According to the existing instructions, at the present time the following are covered by inoculations: workers at livestock farms, livestock procurement centers, zootechnicians and veterinary workers, individuals servicing animals in the private sector of all populated centers, regardless of whether there is an epidemiological problem or not, private owners of cattle in all populated areas that have this problem, as well as workers at all meat-packing plants and slaughterhouses, tanneries and factories where fur is submitted to primary processing.

Thus, there is still no differentiated approach to inoculation of people against anthrax as related to the epidemiological situation of populated centers with respect to this infection, as well as other effective measures.

However, in view of the fact that inoculation of the public plays only an ancillary role in the set of measures to control this infection, as well as the fact that inoculation is not indifferent to the human body, it became necessary to adopt a differentiated approach to this measure.

At the present stage, when only sporadic cases of anthrax are recorded among animals, it is not expedient to adopt mass scale inoculation of the public.

Thus, for almost 2 decades, there have been no recorded cases of an occupational or industrial nature. Regularly scheduled inspection and bacteriological testing of carcasses for anthrax, as well as inspection of hides and other products of animal origin using the Ascoli reaction are very important, along with preventive inoculations, in preventing infection of this group. Many units of hides were inspected between 1946 and 1976, some of which were found to be contaminated with anthrax. While in 1946 there were 0.23% positive reactions, in 1975 the percentage was 0.0032.

Thus, along with increase in amount of hides inspected there was a drop to one-seventy-seventh of the previous percentage of positive reactions. This indicates that there is an annual decrease in contamination of raw material of animal origin with anthrax spores, which also lowers the risk of infection. For this reason, because of implementation of intensified and effective measures to detect anthrax-infected raw material, in our opinion it is possible, even now, to reduce to a minimum inoculations of the urban population engaged in the industry of processing animal raw material and products of animal origin. As for the public whose work is related to animal care, it should be inoculated only in manifest areas, i.e., those with recurrent and permanent sites of anthrax.

On the other hand, the quality of this measure must be upgraded, since of the anthrax cases of the last 10 years (1967-1976), 38.5% were referable to individuals who were not inoculated but were supposed to be, in 14% of the cases anthrax occurred among inoculated individuals, and if we proceed from the number who should have been inoculated the figure would reach 44.4%.

Health education work should also be upgraded, particularly among the rural population, the morbidity rate for which constitutes 99.2% of overall morbidity in the republic. Special attention must be devoted to the danger of infection when there is forced slaughtering of livestock, as well as when skinning carcasses, since they have been the cause of infection in 81.4% of the recent cases. This applies, first of all, to livestock owners and individuals servicing livestock in the private sector.

We must conclude that anthrax is not a totally controllable infection, and this is related to the biological distinctions of the pathogen. For this reason, there may be sporadic cases of anthrax among humans due to endemic soil sites or infected objects for a long time to come.

At the present time, the armamentarium of the veterinary and medical services includes very effective agents for the treatment of patients suffering from anthrax, so that the main question is early detection thereof. However, there is another equally pressing problem, that of educating medical workers in the field of early detection of this infection, since the correct original diagnosis was made in only 57% of the cases in the last 5 years. This would lead to prompt hospitalization and effective treatment of individuals suffering from anthrax.

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RESULTS OF SCREENING THE INHABITANTS OF SOME REGIONS OF MOLDAVIAN SSR FOR ANTIBODIES TO TICK-BORNE ENCEPHALITIS

Kishinev ZDRAVOOKHRANENIYE in Russian No 2, 1978 pp 39-40

[Article by P. I. Yarovoy, P. G. Skoferts and N. D. Korchmar', Moldavian Scientific Research Institute of Hygiene and Epidemiology (Docent A. P. Diskalenko, director), submitted 18 Aug 77]

[Text] Investigations of the last few years revealed that tick-borne encephalitis, an infection that was considered, quite recently, inherent mainly in eastern parts of the USSR, is widespread. Endemic sites of this infection have been detected in several republics of European USSR (Belorussia, the Ukraine, Lithuania, Latvia and Estonia), as well as many European countries (Austria, Bulgaria, Hungary, Poland, Czechoslovakia, Romania, GDR, FRG and others) (V. V. Kucheruk et al., 1969).

Analysis of ecological factors involved in circulation of the pathogen of tick-borne encephalitis in endemic sites in the above-mentioned republics and countries revealed that they were similar to those in Moldavian SSR.

In this article, we submit the results of a search for antibodies to tick-borne encephalitis in the serum of inhabitants of certain rayons of Moldavian SSR.

The base material for detection of antibodies to tick-borne encephalitis was blood serum taken from healthy individuals (donors) living in Kishinev and 14 rayons of the republic (Vulkaneshtskiy, Glodyanskiy, Kalarashskiy, Kaushanskiy, Komratskiy, Kotovski, Kriulyanskiy, Leovski, Nisporenskiy, Rezinskiy, Strashenskiy, Faleshtskiy, Ungenskiy and Chadyr-Lungskiy).

Antihemagglutinating antibodies were demonstrated using the hemagglutination inhibition reaction (RIHA) and the conventional technique. Standard diagnosticum manufactured by the Tomsk Scientific Research Institute of Vaccines and Sera was used as antigen.

In all, 2634 sera were submitted to RIHA. Antihemagglutinating antibodies were demonstrated in 16 samples, or 0.6% of the cases. If this index is calculated in relation to the number of sera from areas where a positive result was obtained, the positive reactions would constitute 1.1%.

The antibody titer ranged from 1:20 to 1:320. Of the 328 serum samples obtained from urban residents, 2.1% were positive, and of the samples from the rural population, 0.4% was positive.

Analysis of the positive findings of antihemagglutinating antibodies among the rural inhabitants of various regions revealed that the incidence of detection of antibodies varies (see Table).

Results of RIHA with serum from individuals in different regions of Moldavian SSR

Administrative rayon	Number of serum samples	Positive reactions %	Titer of positive sera
Kishinev	320	2.1	1:20-1:160
Vulkaneshtskiy	148	-	-
Glodyanskiy	139	0.7	1:20
Kalarashskiy	169	-	-
Kaushanskiy	243	0.4	1:20
Komratskiy	212	-	-
Kotovskiy	213	2.4	1:20-1:40
Kriulyanskiy	175	0.6	1:20
Leovskiy	196	2.0	1:20-1:320
Nisporenskiy	306	0.3	1:40
Rezinskiy	135	-	-
Strashenskiy	41	-	-
Faleshtskiy	50	-	-
Ungenskiy	161	-	-
Chadyr-Lungskiy	222	-	-
totals	2738	1.2	-

The data listed in the Table indicate that there were different levels of antihemagglutinating antibodies to tick-borne encephalitis in inhabitants of different regions of the republic. No antibodies were demonstrable in some regions. In a group of rayons, the inhabitants of which presented antibodies to tick-borne encephalitis, there were substantial differences in incidence of positive RIHA. While positive RIHA constituted 0.3-0.4% in Kaushanskiy and Nisporenskiy rayons, this index was up to 2.0% in Leovskiy Rayon and Kishinev. Antihemagglutinating antibodies to tick-borne encephalitis were demonstrated in nine women and seven men. The age-related distribution of individuals with positive antibody findings was as follows: 1 up to 20 years of age, 11 21-30 years old, 2 31-40 years of age and 2 40 or older.

The highest antibody titers were found among residents of Leovskiy Rayon (1:40 to 1:320) and Kishinev (1:20 to 1:160). In one resident of Nisporenskiy Rayon, the antibody titer was 1:40, and in residents of the other rayons, 1:20.

It is known that demonstration of antibodies to some pathogen or other in noninoculated individuals is a rather objective and unquestionable, though not absolute, indication of existing or prior (acute or latent) infectious disease. This applies in particular to infections induced by viral agents, most of which, after penetrating into the body, induce production of antibodies in rather high titers, which persist for a longer time than antibacterial antibodies. Evidently, there is validity to the opinion of some researchers (L. G. Gol'dfarb, 1976) that cumulative infection with this pathogen is reflected in the immunological structure of the population. But, in our opinion, it must be stressed that such interpretation is valid provided that the screened population had not been previously inoculated against this infection.

The results obtained warrant the assumption that there are endemic sites of tick-borne encephalitis under the natural and climatic conditions of Moldavian SSR. This is based on the fact that antibodies to tick-borne encephalitis were detected in rather high titers among individuals living permanently in Moldavia, who had never traveled beyond its frontiers. This is also indicated by the positive results of testing for antihemagglutinins in domestic animals. Antihemagglutinins to tick-borne encephalitis were demonstrated in titers of 1:10 and 1:40 in the serum of 2 out of 73 tested cows belonging to residents of the villages of Lipovets and Bolotino in Glodyanskiy Rayon.

Evidently, tick-borne encephalitis in humans is of the European type, i.e., in a very mild form, and it is not detected clinically. Isolation of the virus should serve as the definitive confirmation of existence of sites of tick-borne encephalitis in Moldavian SSR.

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PUBLIC HEALTH

SEXOPATHOLOGIST DISCUSSES CAUSES OF FRIGIDITY IN WOMEN

Moscow ZDOROV'YE in Russian No 5, 1978 pp 14-15

[Article by A. M. Svyadoshch, professor, Leningrad: "'Cold' Woman"]

[Text] Love, ardor, passion... Eternal yet in many respects mysterious feelings. Poets and artists always engaged in their description and interpretation more than scientists, because it seemed that this area was inaccessible to precise and strict scientific analysis.

In fact, everything is very individual here. Nevertheless, more and more scientific data making it possible to also observe the patterns in the relations between men and women have appeared recently.

It is characteristic of our days that people, convinced of the power of scientific knowledge, expect and demand from scientists help in the solution of complex problems of love and conjugal life. Frigidity, that is, sexual coldness in the woman and the absence in her of the strong feelings that are difficult to describe and that can be called the culmination of intimacy (orgasm), becomes such a problem for many couples.

According to our data, one out of five women married for no less than 2 years never experienced this feeling. Among those engaged in sexual activities for less than 1 year almost one-half remained frigid, and for more than 10 years, 10 percent.

The results of the questioning of women conducted by U.S. scientists proved to be approximately the same. Of the 1,500 women examined in Vienna one-third never had orgasms. According to Schnabel's data (GDR), more than 45 percent of the women have orgasms on extremely rare occasions and to many they are altogether unfamiliar. The French gynecologist Michelle Wolfrom reached approximately the same conclusion.

However, we will not hasten to conclusions about the natural coldness of women. The inability to experience orgasm (anorgasmy) is a relatively rare phenomenon. It is based on a congenital deficiency of the psychosexual function, which, according to scientists' assumptions, is caused by neuroendocrine

or other disturbances occurring during the intrauterine period. In these cases sexual desire is sharply diminished and orgasm does not occur under any circumstances, although the desire for tenderness and caressing, like all other manifestations of femininity, are completely intact.

Retarded frigidity is more widespread. It is of a temporary nature and is connected with a late (retardation means delay) development of sexual feeling, when the ability to experience orgasm appears only several years after marriage, or after childbirth.

Frigidity can become one of the manifestations of some general (nervous or endocrine) disease or chronic, especially alcoholic, intoxication. Sometimes it appears occasionally in connection with avitaminosis, acute infections or sharp overfatigue.

However, psychogenic frigidity, that is, frigidity due to causes of a psychological nature, is the most frequent variant. Marriage to an unloved man, the husband's carelessness and crudeness during the wedding night, fear of pregnancy and lack of confidence in the stability of family relations--all this can hinder the woman's sexual function.

In one of our patients anorgasmy occurred after her husband had insulted her terribly. Although reconciliation followed and the unfortunate episode was seemingly forgotten, the completeness of feelings did not return. Only a special treatment administered for several years helped to restore harmony in the family.

One can assume that only in one-third of the cases anorgasmy is due to the characteristics of the female organism and in two-thirds, to the disharmony of marital relations. By this we do not at all want to say that two-thirds of the husbands love or are loved insufficiently, or that their masculine capabilities are impaired in some way. Not at all!

Disharmony can appear (and this happens very often) in completely healthy couples who married for love and are sincerely attached to each other. Usually, the cause lies in the husband's incorrect behavior and in his wrong ideas about women's physiology and psychology and often in a lack of the necessary intuition and capacity for understanding the most intimate sphere of relations.

In the organisms of all living beings the genetic code establishes programs aimed at ensuring the continuation of the species. However, in contrast to animals in man they are under the control of the consciousness and under the rule of the system of higher emotions. On the basis of the biological sex instinct a complex multilevel feeling of love, in which physical desire is only one of the components, is formed in man.

In women this component occupies a slightly different place in the general palette of love than in men. The desire for motherhood and for caring for another being is the most important direction of female sexuality. One can

say that women's sexual feeling is more altruistic, more spiritual and more selective... This is manifested during the period of its formation and development. Most young men quite clearly experience a desire for physical intimacy, whereas to the majority of the young women of the same age such a desire is still unknown. As a rule, girls want to have a romantic admirer, friend and protector and dream about lofty and platonic relations.

Having married and experienced family life for more than 1 year, the woman continues to highly value in the man the ability to delicately express his love, kindness, deference and attentiveness. The attitude toward the man as an individual and the evaluation of his spiritual qualities and his role as a father largely determine the satisfaction with family life.

One should not think that sex life is completely separated from daily life. The mutual relationship between "day" and "night" is very great and, especially, for the woman. "During the day my husband never comes close to me, embraces me, praises me, says a kind word to me, brings me a bouquet of flowers. How can I get in the mood?..." one patient complained to me.

Lack of attention on the part of the husband, his indelicacy, rebukes and petty quarrels--all this, deposited in the consciousness, hampers the reactivity of the brain structures that increase the sensitivity to sex stimuli.

The husband who assumes that some special physiological phenomenon making physical intimacy possible exists only in him, while nature assigned a passive role to his wife and she can always respond to his desire with the same readiness, is mistaken. No, not always! The woman needs a special psychological mood. Without the appropriate emotional charge everything that is happening can be perceived by her as purely mechanical, indifferent or even unpleasant acts.

The intensification of sexual excitability occurs differently in men and women. In men it can be depicted in the form of a curve that rises rapidly and, reaching the peak, sharply drops. In women the same line rises gradually and gently and drops more slowly. Usually, this characteristic explains the non-coincidence of feelings in time, which distresses many couples.

The woman's sensuality should be aroused. She must be led to the moment of flight of emotions that both will experience. An unhurried prelude to intimacy, which stimulates the sensitivity of the woman's erotogenic zones, helps in the attainment of a unity of sensations. The woman perceives intimacy itself as a moment of absolute physical and spiritual merging with the loved man and the fact that the "slump" in emotions occurs in him so instantaneously deeply offends and disillusiones her.

The woman more than the man is particular about the ritual of intimacy, gesture, touch, word. This is not a whim--these are the characteristics of her nervous reactions.

One patient told me: "When my husband whispers tender words to me, everything is fine with me. But when this happens in silence, then even if he is completely 'in form,' there is no satisfaction." At such moments the woman wants to hear that she is loved--another confirmation of the characteristics of female emotionality not accepting physical intimacy without spiritualizing it with lofty senses.

It is well known that enamoredness makes a person more responsive to sexual stimuli. However, if enamoredness passes over the years, giving way to a strong attachment, gratitude and spiritual closeness, this does not mean that the intensity of intimate relations should be lost. These feelings can play the same role of natural catalysts.

Time does not become an enemy of love, because it makes it possible to get to know better the loved person and to learn to guess his wishes. Such understanding helps the man and suggests to him how to overcome his wife's frigidity.

As is well known, according to religious views only the birth of a child could serve as a moral justification for intimacy. In itself intimacy was considered base and, therefore, the desire to derive joy from it was viewed as depraved and unworthy.

The echoes of such views subconsciously live in many of us even now, being more characteristic of women than of men. Often an extremely shy and reserved wife rejects the husband's attempts at variety because she is not sure of their moral acceptability. In this case great delicacy and the ability to create a tonality, a mood, which would help the woman to acquire inner freedom, is required of the man.

Sometimes, taking into consideration the woman's anatomical features, the sexopathologist suggests variants of intimacy optimal to the couple in such cases. This removes the disharmony clouding conjugal life.

Women deal differently with anorgasmy. Some are little troubled by it. Mutual attachment, good relationships and concern for the children--all this fills their life and a thought about some imperfection does not even occur to them.

Others take this phenomenon with difficulty. Sexual intimacy without orgasm produces in them distressing nervous tension (frustration), pain in the loins and a feeling of pressure below the stomach caused by congestion in the organs of the lesser pelvis. Prolonged frustration contributes to the occurrence of neuroses and functional disturbances of internal organs, hormonal disorders and intensified menstrual bleeding.

Dissatisfaction with the moments of intimacy develops into dissatisfaction with family life and often leads to a divorce. There are data to the effect that approximately 30 to 40 percent of the disintegrating families disintegrate precisely for such a reason. This problem cannot be ignored. Would it be correct to ignore it?

The experience in the treatment of frigidity in women and of sexual disorders in men indicates that in many cases these disturbances can be eliminated. The situation can be corrected not only in young families, but also when many years were lived without joy.

The methods of treatment depend on the cause of the disorder. Psychotherapy, sometimes physiotherapy and various medications are used. However, in all variants the couple's adaptation, their mutual adjustment to each other, their desire to find the optimal variant of mutual relationships and their aim of not only receiving, but also giving joy in intimacy remain the main conditions ensuring the success of medical measures.

Talks with the husband and wife are of great benefit. They help them to correctly evaluate the situation that has been created and to overcome psychological barriers. Specialists call this the "optimization of the conjugal pair." In fact, how important it is for everyone to become more sensitive and kinder, to better understand his partner and to reach the maximum of his capabilities!

Incompatibility can be overcome and at times not so much is needed so that disharmony may give way to harmony so necessary for every marital pair.

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DISPERSION ANALYSIS AS A METHOD OF EVALUATING THE MULTIFACTOR EFFECT OF THE
CHEMICAL INDUSTRY ON MORBIDITY OF WORKERS

Kiev VRACHEBNOYE DELO in Russian No 4, 1978 pp 125-127

[Article by G. A. Pushin, Department of Social Hygiene and Organization of
Public Health of the Zaporozhye Medical Institute]

[Text] The chemical industry in our country is developing at accelerated rates; annually new enterprises are built, and the number of workers increases. A considerable percentage of the workers are women in whom the level of morbidity is higher than in men. Due to this a differentiated study of the health of men and women is an important socioeconomic task.

This report is a fragment of the comprehensive study we made on the state of health of workers in the chemical industry in which we set the goal of citing certain comparative data on morbidity levels with time loss of capacity for work which were obtained by using ordinary statistical methods and dispersion analysis to determine the strength and degree of effect of the most significant factors on the formation and levels of morbidity separately in men and women. Materials were used of the time incapacity for work of workers, and engineering and technical workers of the plant "Kremniypolimer."

Total data were taken for processing on 884 people that had worked in this industry not less than 3 years; 220 of them comprised the control group. Workers were taken for the study from similar shops in the production of organosilicon compounds (ethoxysilanes, silane chlorides, organosilicon polymers). The control group consisted of workers not from the chemical shops of the same plant (repair-mechanical, steam power, transportation, and others).

The age of 28.2% of the workers of the chemical shops--to 30 years, 51.6%--from 30 to 39, and 20.2%--from 40, and older. Men comprised 55.7% of the group, and women--44.3%. In the control group 35% were under 30, 38.2% from 30 to 39, and 26.8% from 40 and over; 61.4% were men and 38.6% women.

The working conditions of the workers in the chemical shops are distinguished from those of the control group by certain unfavorable factors.

A deeper analysis of the morbidity with time loss of capacity for work over a number of years revealed its higher level in the workers of the chemical shops as compared to the control respectively: in instances--80.6, 58.9; in days--547.2, 514.9 per 100 workers (in working days). Standardization in age and sex conducted by an indirect method did not change the ratio of these indices (respectively: in age in instances--80.8, 58.7; in days--550.4, 506.2; in sex in instances--80.4, 59.5; in days--546.6, 516.8).

In the main shops there were statistically reliable differences in the morbidity levels for neuralgia, neuritis, and radiculitis (difference of indices 3.21 ± 0.83), phlemons, abscesses and panaris (0.8 ± 0.26), dermatitis (0.8 ± 0.44), chronic gastritis (1.3 ± 0.24), diseases of visual organs (0.7 ± 0.2), diseases of arteries, veins, and lymph vessels (0.7 ± 0.17), and diseases of the LOR organs (0.6 ± 0.2). This indicates the etiological link of morbidity to the conditions of chemical production.

In the women workers of the main (chemical) shops as compared to the control higher levels were noted in the disorders of the ovarian-menstrual cycle (difference of indices 5.7 ± 1.9).

Indices for all the morbidity with time loss of capacity for work in the women were higher than in the men (respectively: in instances--93.3, 70.5; in days--611.0, 495.6). Standardization according to age did not change the ratio of these indices (respectively: in instances--95.1; in days--631.1, 491.3).

In women as compared to men the level of morbidity for influenza and acute respiratory diseases was higher-- 11.5 ± 3.7 , and for diseases of the kidneys and urinary organs (2.9 ± 1.1).

In men as compared to women the level of diseases of the osseous-muscular system was higher, the difference of the indices was 2.3 ± 1.1 .

With an increase in the age of the workers both in instances and in days of incapacity for work a dynamic increase was noted in the levels of all morbidity.

Certain peculiarities were also noted in the levels of morbidity in the production-occupation groups. The highest levels of all morbidity were found in workers of the main production group, then in workers of the branch works, and the lowest in the engineering and technical workers.

The computed coefficients of the correlation indicate the presence of an inverse relationship between the material well-being and morbidity and the time loss of capacity for work (in instances $r_{xy} = -0.24 \pm 0.03$, and in days $r_{xy} = -0.06 \pm 0.02$).

(1)	(2)	Эксперимент при $D=D_1$				Эксперимент при $D=D_2$				таблич. знач. F_T	
		(3)	(4)	(5)	(6)	(7)	(4)	(5)	(6)	(7)	(8)
Источники дисперсии	Число степеней свободы, K	сумма квадратов S	доля влияния (%)	дисперсия $\sigma^2 = \frac{S}{K}$	отношение дисперсий $F_{cp} = \frac{\sigma^2}{\sigma_0^2}$	сумма квадратов S	доля влияния (%)	дисперсия $\sigma^2 = \frac{S}{K}$	отношение дисперсий $F_{cp} = \frac{\sigma^2}{\sigma_0^2}$	$P_F - 0,05$	$P_F - 0,99$
A (10) (11)	1	20138,8	35,7	20138,8	15,0	69190,4	47,4	69190,4	21,8	5,79	12,25
	2	18379,75	32,6	9189,9	6,9	30818,9	21,1	15409,4	4,9	4,74	9,55
	1	8490,65	15,1	8490,65	6,3	23767,0	16,3	23767,0	7,5	5,59	12,25
	7	9389,7	16,6	1341,4	—	22190,6	15,2	3170,1	—	—	—
Остаток (13)	11	56398,9	100,0	—	—	145966,8	100,0	—	—	—	—
(14) Итого	11	56398,9	100,0	—	—	145966,8	100,0	—	—	—	—

Key:

1. Source of dispersion
2. Number of stages of freedom, K
3. Experiment with $D=D_1$
4. Sum of squares S
5. Percent of influence (%)
6. Dispersion
7. Ratio of dispersions

8. Experiment with $D=D_2$

9. Tabular value

10. A

11. G

12. Z

13. Residual

14. Sum

Thus there is a definite relationship between morbidity and the level of material well-being--it is more pronounced in the days of incapacity for work.

To explain the effect on the state of health of both individual factors and their interaction, by using the method literature of a number of authors (K. A. Braunli, 1949; B. S. Bessmertnyy, 1967; Ye. I. Pustyl'nik, 1968; D. S. Sepetliyev, 1968; L. Ye. Polyakov, D. M. Malinskiy, A. V. Kudinov, 1969; I. V. Polyakov, N. S. Sokolov, 1969; and others) we compiled different statistical complexes¹, and according to them made a one-, two-, three and five-factor dispersion analysis that made it possible to reveal those factors which exert the greatest percentage of the effect on the result-producing sign. On this basis a statistical complex was compiled separately for men (D_1) and for women (D_2) which included the most significant factors: production¹(A), age (G), level of per capita income (Z), and a three-factor dispersion analysis was made according to them. The results of the dispersion analysis for men ($D=D_1$) and for women ($D=D_2$) are given in the table.

Selection and grouping of the statistical complexes for dispersion analysis was made by us according to the varieties of factors, and they were processed on calculators.²

The results of dispersion analysis showed that the morbidity of men is most affected by the production factor (35.7%), then age (32.6%), and the least--level of per capita income (15.1%).

The morbidity of women was also most affected by the production factor (47.4%), then age (21.1%), and the least--level of per capita income (16.6%).

We attempted to establish whether the effect of the indicated factors on the result-producing sign is reliable. We can find an answer to this question by comparing the coefficients of the factor dispersion (F_f) with its tabular value (F_t). If the obtained value is fairly large, then the action of any factor should be acknowledged as not random. With $F_f > F_t$ one can assume that the observed differences are significant. With $F_f < F_t$ it can be considered that they are random. Consequently, the effect of all^t these factors on the morbidity should be considered proved.

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¹By the statistical complex is understood observations grouped according to factors and given in a special table for their processing by the method of dispersion analysis.

²Dispersion analysis was conducted with the participation of our colleague of the Institute of the Physics of Metals of the Ukrainian SSR Academy of Sciences V. G. Pushin.

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ROLE OF THE ORGANOCHLORINE AND ORGANOPHOSPHOROUS PESTICIDE COMPLEX IN THE DEVELOPMENT OF CEREBRAL ATHEROSCLEROSIS

Kiev VRACHEBNOYE DELO in Russian No 4, 1978 pp 19-23

[Article by K. V. Fokina and V. P. Bezuglyy, Department of Clinical Pathology of Chemical Etiology of the All-Union Scientific Research Institute of Hygiene and Toxicology of Pesticides, Polymers and Plastics]

[Text] In recent years in the structure of vascular diseases of the brain atherosclerosis has been dominant. This circumstance increases the urgency of the problem of atherosclerosis of the cerebral vessels; here the etiological factors are given enormous importance. In the clinical practice of diseases of chemical etiology the most complex and important is the question of the possible development of stable organic changes in the vascular system of the brain, and in particular, the development of cerebral atherosclerosis during lengthy exposure to various chemical compounds.

Among the "atherogenic" poisons the most studied are carbon disulfide and lead. Thus, in the opinion of a number of authors (Lagge, Godbi, 1921; Ettinger et al., 1952; Vil'yan, 1954) carbon disulfide affects not so much the nervous system, as the vascular system, and pathological changes occurring in the organism are governed by affection of the vessels. The serious sclerotic changes in the cerebral vessels, optic fundus with the development of encephalopathy, as well as the peripheral vessels of individuals that had lengthy contact with carbon disulfide and lead in the process of production were indicated by Lyui, Al'pers (1941), Ettinger et al. (1952); Ambrozio et al. (1957); N. I. Grashchenkov (1960); S. A. Peysakh and Kh. M. Kadyrbayeva (1960). The possible participation of the chemical factors in the accelerated development of cerebral atherosclerosis no longer is doubted.

The role of pesticides and their complexes in the development of cerebral atherosclerosis in man has currently not been studied--clinical data are lacking on this question. There are only individual experimental studies. (A. D. Lukanevoy and G. A. Rodionova, 1973) that indicate the ability of organochlorine pesticides (DDT) and sevin to intensify cholesterol atherosclerosis, and a study has been made of the definite role of the organochlorine and organophosphorous pesticide complexes in the development of

atherosclerosis of the coronary vessels in people that have lengthy occupational contact with the indicated complex of pesticides (V. P. Bezuglyy, N. Z. Gorskaya, 1976).

Therefore we were faced with the task of studying the role of the organochlorine and organophosphorous pesticide complexes in the development of cerebral atherosclerosis. Here we were interested in the question of the remote consequences of the transferred acute and especially chronic effects of the indicated pesticide complex in the development, course, and increase of frequency of cerebral atherosclerosis. For this purpose two groups of adults were examined of the able-bodied population that lived in regions with a different level of pesticide application. In addition to outpatient examination deeper studies were made under hospital conditions of individuals that had lengthy contact with the organochlorine and organophosphorous pesticide complexes. According to occupation these are primarily field-crop growers, disinfectors and agricultural chemists, among them the predominant group was women in the age group 31-50 with work record over 10 years. In the control group (85 people) women also dominated of the same age group.

Besides conducting general-clinical study indices of lipid metabolism were also investigated (cholesterol content in blood serum--according to the method of Il'k, and phospholipids--according to Fifke-Subbarou, and β -lipoproteins--according to Burshtein), and a study was made of the bioelectrical activity of the brain by the electroencephalographic method. In order to reveal the early signs and to confirm the cerebral atherosclerosis rheoencephalographic studies (REG) were made.

The clinical pattern of the nervous system during the lengthy action of the organochlorine and organophosphorous pesticide complexes in the examined individuals was characterized by the functional-dynamic (astheno-autonomic syndrome, autonomic-vascular dystonia) and organic changes in the nervous system (astheno-organic syndrome, encephalopathy, and encephalopolyneuritis with increased frequency of involvement of the hypothalamic region in the pathological process). The hypothalamic syndrome had a polymorphic nature. According to the generally accepted classification of N. I. Grashchenkov (1964) the most frequently observed are the autonomic-vascular and autonomic-visceral paroxysms primarily of the sympathicotonic type, and considerably less often--neuro-endocrine form, disruption of sleep and insomnia.

Besides changes in the nervous system signs of cerebral atherosclerosis were found in the examined subjects. Here cerebral atherosclerosis was encountered reliably more often in the region with a high level of pesticide use (in 10.4% of the people versus 6.7% in the region with a low level of pesticide use, $D < 0.01$). According to the data of the hospital study the cerebral atherosclerosis was found in 26.9% versus 11.8% in the control group.

The clinical pattern of cerebral atherosclerosis in individuals in contact with the pesticide complex was not distinguished by a specificity. Its first (initial--in 14.9%) and second (moderate--in 22.4%) stages were isolated.

The patients noted heaviness in the head, inconstant dull headaches, noise in the ears, light inconstant vertigo, and shortening of sleep. A general weakness, rapid exhaustability, certain disorders in the nerve-psychic sphere in the form of apathy, retardation, emotional lability were observed, and a reduction in memory of current events, and attention disorder were noted. The frequency of complaints indicated the degree of markedness of the atherosclerotic changes in the cerebral vessels. In an objective study of the nervous system light passing functional deficiency of the cranio-cerebral nerves was isolated: change in convergence, slight myosis, light reduction in pupillary reflexes, inconstant elements of Gorner's syndrome, slight symptoms of paresis of the facial nerve, and not sharply pronounced symptoms of oral automatism. Slight asymmetry and increase in the vaso-constrictor reflexes were noted on the background of a reduction in or lack of skin reflexes. Disorders were found in the autonomic nervous system: acrohyperhidrosis, acrohypohermy, lability of vasomotors of the face and neck, changes in dermatographism, and an increase or asymmetry of the temporal-humeral coefficient. On the whole in initial cerebral atherosclerosis early and leading is cerebrosthenic syndrome in combination with passing vascular-dystonic symptoms, including those which are present in the vessels of the optic fundus (expansion of the venous network, nonuniformity of the size of arterioles, and their slight twisting). With a moderate stage of atherosclerosis encephalopathy was combined with passing disorders of the cerebral circulation. In these patients signs were also observed of atherosclerosis of the coronary vessels and aorta. Headaches were of the paroxysm type in the occipital region with irradiation into parietal and temporal regions; often pain of the "half-helmet" type was noted which was combined with vertigo. These phenomena were especially marked at the height of the headaches and had an intermittent nature with pronounced autonomic manifestations.

Clinically transient disorders of cerebral circulation were characterized by a disruption in the function of the trunk structures of the brain in the form of nystagmus, damage to the oculomotor and abductor nerves in combination with the cerebellum disorders. It should be noted that the revealed focus was governed by disorders in the hemodynamics in the basin of the vertebro-basilar arteries. Attention is drawn to the fact that in patients with intervals between the vascular crises often slight symptoms were found of affection of the extrapyramidal system: a certain reduction in the plasticity of movements, inhibited walk, not sharply pronounced hypomimicry, monotonous soft speech, disorder in handwriting, and stooping.

Characteristic symptoms indicating the progressing disruption of cortico-nuclear bonds are the increase in frequency and pronounced nature of the subcortical reflexes: volar-mental reflex and Bechterew's nasal reflex. On the optic fundus sclerosing of the vessels was noted.

As a result of the electroencephalographic studies in individuals in contact with the complex of pesticides in cerebral atherosclerosis it was found that the most typical feature of the changes in the bioelectrical activity of the brain was diffusion of disorganization of all rhythms, here more pronounced

than in individuals of the control group. In 25.5% of the patients with cerebral atherosclerosis during the action of the pesticide complex out-breaks were observed of bilaterally synchronous high-amplitude activity, characteristic, according to N. P. Bekhtereva, for affection of deep cerebral structures (the differences are statistically reliable as compared to the control group).

The results of rheoencephalographic studies indicated that the reduction and loss of elasticity in the vascular wall during atherosclerosis of the cerebral vessels of individuals in contact with the pesticide complex appeared on the REG with the following signs: 1) an increase in the length of the ascending portion of the wave to 0.14 sec in the initial stage, to 0.185 sec on the hemispheres, to 0.19 sec on the occipital and temporal REG with moderate stage of cerebral atherosclerosis as compared to the control group (the differences are statistically reliable, $D < 0.01$); 2) by a varying degree of flattening of the top of the curve as compared to the control rheographic curve; 3) by smoothing out of the dicrotic projection all the way to its disappearance; 4) by reduction in the amount of amplitude of the curve in the initial stage on the average on the hemispheres to 0.074 ohm, on the occipital to 0.037 ohm, and on the temporal up to 0.066 ohm as compared to the control (the differences are statistically reliable, $D < 0.01$). A sharper reduction in the amount of amplitude, especially on the occipital REG as compared to the control was observed at the moderate stage of cerebral atherosclerosis. After the use of 0.0001 nitroglycerin (sublingually) in the majority of cases a small increase occurred in the amplitude of the rheographic wave without a change in its shape, and without the appearance of a dicrotic projection.

The conducted rheoencephalographic studies in individuals in contact with pesticides reflect the hemodynamic disorders primarily in the basin of the vertebrobasilar arteries where earliest and to a more pronounced degree disorders developed in the vascular tonus and cerebral hemodynamics.

An analysis was made of cerebral atherosclerosis with regard for the age and length of work record. The frequency of cerebral atherosclerosis in the age groups 31-40, 41-50 and 51-60 statistically reliably increased with the age (respectively 20%, 29.6% and 46.5%) to a greater degree in individuals that had contacted the pesticide complex as compared to the control group. Here attention should be centered on the fact that atherosclerosis of the cerebral vessels is found relatively early, in the age group 31-40 (20% versus 4.8% in the control group; $D < 0.01$). This is primarily individuals that in the past suffered acute pesticide poisoning. The frequency of cerebral atherosclerosis in the groups that worked 1-4 years, 5-9 years, 10-19 years, and 20 years or more that contacted the pesticide complex increased with the work record (respectively 13.2%, 14.4%, 20.8%, and 40.5%) to a greater degree than in the control group, and especially with work record 10-19, and 20 and more years ($D < 0.001$).

As a result of the conducted study of lipid metabolism in patients with atherosclerosis during the action of pesticides it was noted that the content in the blood of cholesterol and lipoproteins was reliably higher than in individuals of the control group (respectively $214 \text{ mg\%} \pm 4.72$ versus $178.3 \text{ mg\%} \pm 4.8$, and $24.3 \text{ unit} \pm 0.5$ versus $21.9 \text{ unit} \pm 1.01$; $D < 0.05$). The content of phospholipids and esterified cholesterol was reduced compared to the control, and the correlation of phospholipids to cholesterol was lower than a unit. The findings of lipid metabolism indicate the definite role of the pesticide complex in the development of atherosclerosis.

Thus, the presented data make it possible to conclude that the organo-chlorine and organophosphorous pesticide complex is a risk factor in the emergence and increase in frequency of cerebral atherosclerosis. Attention should be given to the fact that the signs of atherosclerosis of the cerebral vessels in individuals that had more intensive contact with the pesticide complex develop in a comparatively young (31-40) age group more often than in the control group. From here it becomes necessary to isolate under medical examinations such individuals for investigation and treatment under hospital conditions.

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SOCIAL PSYCHOLOGY

ORIENTATING WORKERS ABOUT THEIR OWN INDUSTRY

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian
No 2, 1978 pp 183-186

[Article by V. Ye. Semenov, Candidate of Psychological Sciences, head of the laboratory of social psychology, NIIKSI (expansion unknown), Leningrad State University, Leningrad: "The Power of Information"]

[Text] Practice shows that there cannot be a united work team if the workers know little about one another, their plans and performance. Each serviceman in the army knows the entire hierarchy of his commanding officers in person. Unfortunately, in industry, each individual worker only knows the foreman of his section.

There is the important problem of information and being informed, which is substantially involved in determining the efficiency of production. We shall dwell briefly on this problem.

At the Svetlana Association (Leningrad), which is known to our entire country, social psychologists interrogated the workers in two shops. They learned that 58% of those questioned did not know the plans for their section, 75% were unaware of the plans for the enterprise as a whole, only 20% knew when the enterprise was founded, 29% were familiar with its traditions and 16% knew about its outstanding personnel. Some of the workers had difficulty in naming the general director of the association. At the same time, many would have liked to obtain some information or other related to the activities of the enterprise.

This sociopsychological study, the first of its kind, had as its objective determination of the effectiveness of socio-industrial information, i.e., information pertaining to the prospects of development of the enterprise and its departments, knowhow of leading workers, activity of public organizations, the history, traditions, personnel at the enterprise, etc.

Whether such information is required in industry is a simple question. Of course it is needed. The study demonstrated this rather definitely. Any step toward development or in the plans of the worker group, and its environment

prompts innumerable questions by workers and, accordingly, a large number of the most varied opinions, which are often fabrications, that can only be curbed by reliable and promptly delivered socio-industrial information. They say that he who is well-informed rules the world. The social psychologist can interpret this saying differently, by changing only the meaning of the word, "world," to refer to orderly, calm intrateam relations and peace* in the group. For example, wrong gradation of prizes, in the opinion of workers, is not actually as substantial as blown up by rumors, when there is no publicity about them, or the information is issued with delay.

The data in the Table list the information requirements and extent to which they are met, with respect to different types of information, for workers in two shops (A, a leading shop and B, one that is behind).

It is remarkable that the most significant shortage of information is experienced by workers in both shops with regard to such important issues to them as wages, people, history of the enterprise, mass cultural and athletic activities.

There is no doubt that, along with an increase in volume of information, there must also be an increase in its effectiveness. We still know too little about how to deliver information more effectively and the most suitable means of delivering it. For example, much was expected from the so-called "running line" [visual information system], but the workers gave a very low rating to its effectiveness and appeal. The study showed that noise makes it difficult to listen to the plant radio, so that it is better to have broadcasts before the start of a shift, during breaks and right after a shift, rather than during work hours. The workers intimate, for example, that a local radio program of news and music, of the Mayak type, would appeal to them, i.e., brief news about the plant or interviews alternating with music (mainly of the variety type and folk songs). It was also proposed that the program schedules of local broadcasts be printed up and passed around to workers.

Thus far, full use is not made at the enterprises of such media as stands, slogans, honor roll plaques, etc. For example, at one plant, the bulletin board is at a respectable distance from a hallway. A long detour must be made to read what is posted there. It is not surprising that few workers get to read it.

Long ago, attention was called to the fact that the syntax of slogans was becoming more complex, that the photos on the honor boards were faceless [?] and seldom changed. It is felt that, in many respects, a psychologist was not involved in setting up the visual displays.

In order to increase the effectiveness of socio-industrial information media, we propose to create special centers at enterprises, to be headed by councils,

*Translator's note: The word for "peace" and "world" is the same in Russian--"mir."

the members of which include representatives from management, public organizations, plant department of scientific organization of labor, sociological service, workers, engineering and technical personnel, white-collar workers. The council could elaborate the necessary standard [model] of the minimum set of information media for each type of department; it would issue information about personalities, history and traditions. It would be desirable to create similar councils or offices in the different departments as well.

Worker requirements [index R] pertaining to various types of socio-industrial information and extent to which they are met [index M]

Types of information	Shop A (leading)		Shop B (lagging)	
	index R	index M	index R	index M
Enterprise plans [prospects]	0.47	0.06	0.26	0.01
Shop plans [prospects]	0.50	0.27	0.26	0.01
Enterprise's history and traditions	0.60	0.06	0.46	-0.04
Plan fulfillment by the enterprise as a whole and its rank in socialist competition	0.50	0.31	0.29	0.04
Plan fulfillment by a shop and its rank in socialist competition	0.52	0.46	0.34	0.21
Knowhow of leading workers, engineering innovations in the field	0.40	0.16	0.24	0.08
Personalities at the enterprise, their work, life and recreational activities	0.60	0.26	0.60	0.02
Trade-union affairs and plans	0.34	0.31	0.31	0.12
Specific rights and duties of workers	0.45	0.29	0.55	0.11
Safety practices	0.34	0.55	0.47	0.54
Plan fulfillment by the individual and his place in socialist competition	0.51	0.36	0.36	0.23
Prospects for worker's specialty	0.40	0.16	0.24	-0.08
Prospects of advancing specialized qualifications	0.41	0.26	0.40	-0.15
Procedures for determining size of bonuses, prizes, 13th of wages [?]	0.68	0.25	0.59	0.15
Mass cultural and athletic activities at the enterprise	0.50	0.16	0.41	0.09

Note: The workers' answers are listed in the form of indices. The values of the indices may range from +1, when all gave an affirmative answer to -1, when all gave a negative answer.

The statute concerning an office of socio-industrial information was proposed and developed by A. A. Rusalinov, candidate of philosophical sciences and senior scientists of NIIKSI, Leningrad State University, and this author, in collaboration with the sociologists at Svetlana. Such experimental offices were organized in 1973 in several shops, including one that had been

previously surveyed. Subsequent investigation of the effectiveness of these offices, including determination of the extent to which workers are satisfied with the information, revealed that they justified themselves.

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PLENUM OF THE BOARD OF THE ALL-UNION SCIENTIFIC MEDICAL SOCIETY
OF LABORATORY PHYSICIANS

Moscow LABORATORNOE DELO in Russian No 5, 1978 pp 315-316

[Article by A. S. Petrova, V. M. Bramberg, and E. G. Larskiy]

[Text] In Riga on September 17 and 18, 1977 the plenum of the Board of the All-Union Scientific Society of Laboratory Physicians was held on the topic "Automation in Clinical Laboratory Diagnostics". Aside from members of the Board of the All-Union Society, representatives of the Ministry of Public Health of the Latvian SSR, the scientific societies of laboratory physicians and oncologists of the Latvian SSR, and the Institute of Experimental and Clinical Medicine of the Ministry of Public Health of the Latvian SSR participated in its organization. The session of the plenum took place in the tall building of the Latvian Academy of Sciences. One hundred ninety-eight delegates from 31 cities of our country were present at the plenum.

At the plenary sessions the following issues were considered:
1) state of development and production of laboratory equipment;
2) experience in applying and operating automatic analytical systems; 3) problems of automating cytological research; 4) mathematical methods of diagnosis and evaluating effectiveness of treatment.

After the introductory remarks by the chairman of the Board of the All-Union Society, Prof. A. S. Petrova, the scientific part of the agenda began with the report by Prof. V. V. Men'shikov, "Possibilities for laboratory diagnostics determined by the level of development of laboratory technology", V. I. Shamenkov, representative of the Leningrad branch of the All-Union Scientific-Research Institute of Medical Polymers of the Ministry of the Medical Industry, spoke on the present state of and outlook for development, growth, and production of laboratory equipment.



At the second session the following reports were given: "Correlation and principles of manual and automated methods (T. I. Lukicheva and I. M. Prudnik, Moscow); "Principles of evaluating an autoanalyzer" (A. S. Green, T. I. Lukicheva); "Experience working with a hemolytic autoanalyzer" (N. N. Turkovskaya, et al., Moscow); "Utilization of a self-recording photometer for determination of leukocyte metabolism" (I. V. Skards and A. Ya. Skarda, Riga); "Experience in organizing a large-scale multi-profile centralized biochemical laboratory using domestic equipment" (N. N. Nikolaenko, Mogilev); "Intra-gastric measurement of pH" (V. P. Orlova and H. A. Kapral, Tallin); "Some ways to improve the functioning of decentralized biochemical laboratories" (G. L. Zuckerman, Mogilev); "On the question of some indicators of the effectiveness of the work of automated biochemical laboratories" (V. V. Men'shikov, T. N. Alexandrovskaya, et al., Moscow); "Evaluating the economic effectiveness of laboratory work handling biochemical research manually and applying autoanalyzers" (E. V. Polyakova, Moscow); "Evaluating the accuracy of determining glucose and aggregate protein on the AB-1 automat" (A. S. Green, T. I. Lukicheva, O. A. Romanovskaya, Moscow); "Some questions of applying the AB-1 autoanalyzer in general medical practice" (V. I. Shamenkov, E. N. Zav'yalov, Leningrad); "Experience in working with domestic autoanalyzers in a centralized biochemical laboratory" (I. S. Greenspan, V. E. Tolchennikov, V. N. Mamonov, Kislovodsk); "On the question of clinical operation of a biochemical analyzer" (G. M. Kostin, Mogilev).

The third session of the plenum began with the report of A. S. Petrova, "The role of automation for analysis of cytological data". Also read were the reports of: V. M. Bramberg et al., Riga, "Automation in cytological diagnosis of malignant tumors"; M. P. Roshonok (Riga), "Methods of preparing and staining cytological preparations for researching the structural form on autoanalyzers with TV screens"; I. Ya. Poriete (Riga), "Concentration of epithelial cells in researched fluids for automatic analysis"; B. A. Janson (Riga), "Errors in analysis of microobjects by television methods"; M. N. Libenson, S. I. Rabinovich, "Mathematical methods for automating early cytological diagnosis of tumor diseases"; Yu. O. Popova, "Experience in operating a television system to search for cells".

At the fourth session these reports were heard: "Information content of generalized embryonic indicators of cancer and non-cancerous diseases of the stomach, the mammary and thyroid glands using a cytoclassifier" (K. A. Agamov, N. I. Nikitin, Moscow); "Methodology and results of differential cytological diagnosis applying generalized embryo indicators" (V. M. Bramberg et al., Riga); "Some questions on organizing collection of cytological data" (T. A. Grendze, Riga); "Application of an automated device,



a "cytoclassifier", for cytological differential diagnosis in researching material from female sexual organs" (L. V. Vecherko, M. P. Roshonok, Riga); "Significance of cytological and cytochemical research methods for determining the effectiveness of chemotherapy and the mechanism of action of different factors on a tumor cell" (I. Ya. Zitare et al., Riga); "Determining the effectiveness of anti-tumor therapy for stomach cancer by morphological signs of change in the tumor" (R. A. Krampe et al, Riga); "Cytomorphological criteria for evaluating the effectiveness of the anti-tumor chemicotherapeutic treatment given" (L. A. Dudarev, Moscow); "State of and prospects for the development of apparatus for hemocytological research" (V. V. Belov, U. A. Vatmacher, Leningrad); "Utilization of mathematical methods for diagnosis of disease of the mammary glands" (A. F. Larin et al., Moscow); "Quantitative methods in researching malignant bone tumors" (N. Yu. Polonskaya, L. P. Koroleva, Obninsk).

The concluding report was devoted to an evaluation of the diagnostic effectiveness of laboratory tests (V. V. Men'shikov).

It should be noted that the plenum evoked great interest in the Riga medical community. Not only delegates, but representatives of scientific and medical establishments in Riga and in the republic took part in it. This interest, obviously, was brought about by the fact that in the republic automated methods are intensively applied, especially in the cytological diagnosis of cancer. It must be emphasized that the work of the plenum was good and clearly organized.

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